THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. XCIII. No. 2235.] LONDON, MARCH 13, 1906. [58TH YEAR. PRICE 6d.

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— *ESTABLISHED 1830.* —

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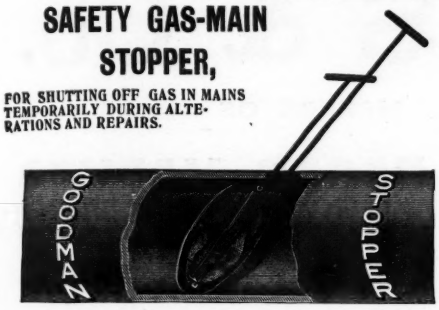
FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS.



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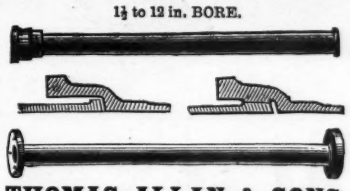

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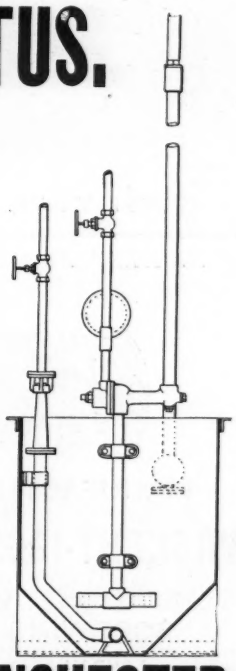

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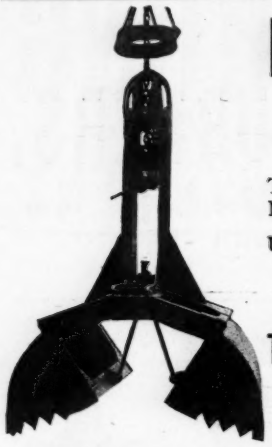

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APPLICABLE TO ANY ORDINARY SINGLE CHAIN CRANE.

These Grabs are unequalled for handling Coal, Coke, Ballast, Sand, Macadam, Ores, &c. effecting in all cases very substantial savings.

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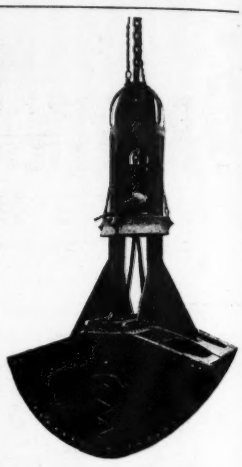

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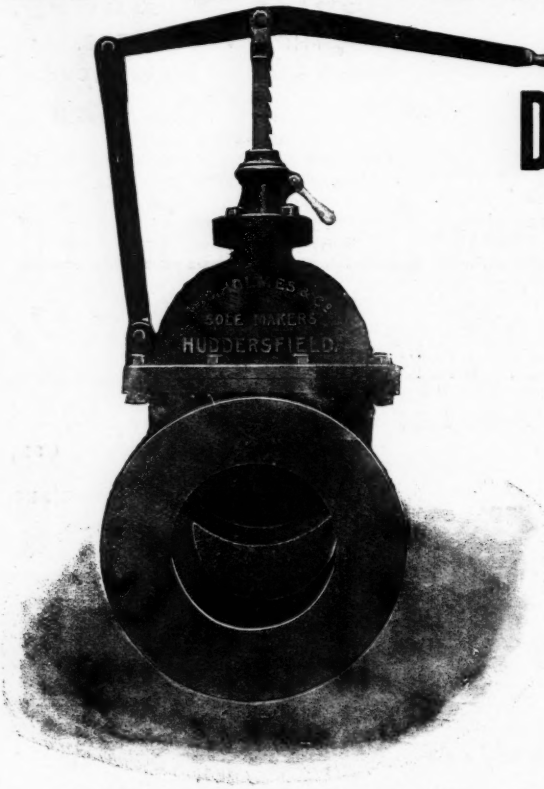

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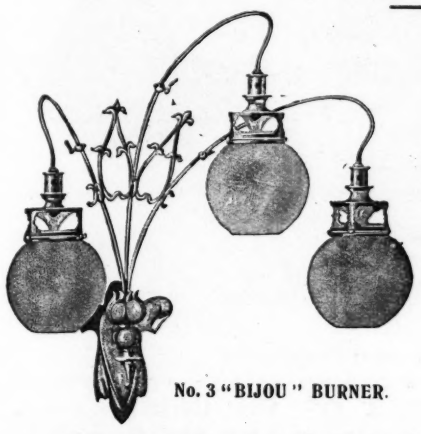

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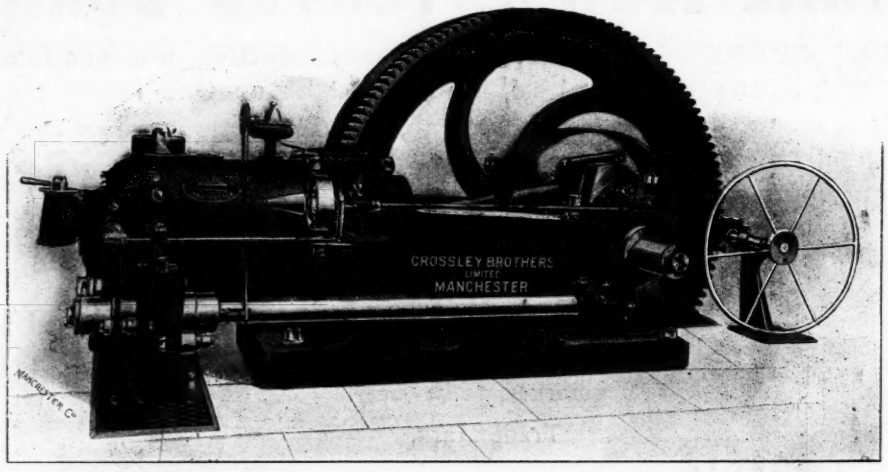

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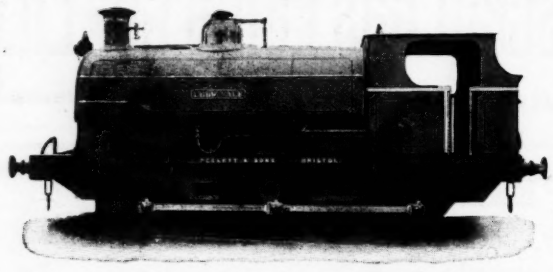

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Can be used anywhere instead of a "C" Burner.

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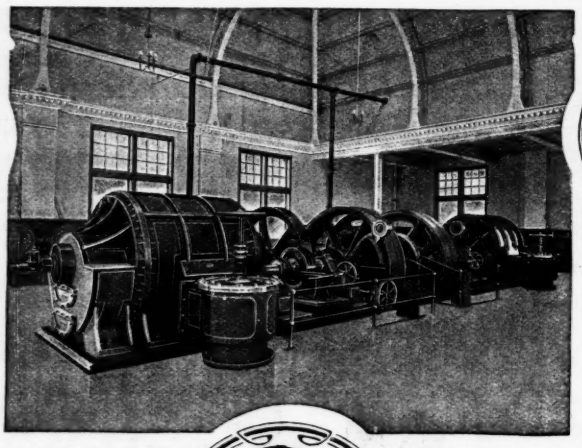

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RADIATE MORE HEAT
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SILCO BRICKS prevent all settling of setting.

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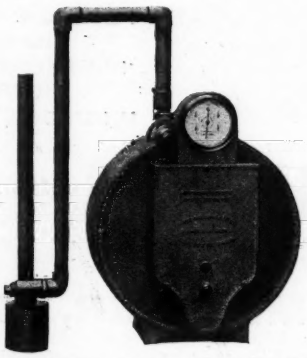

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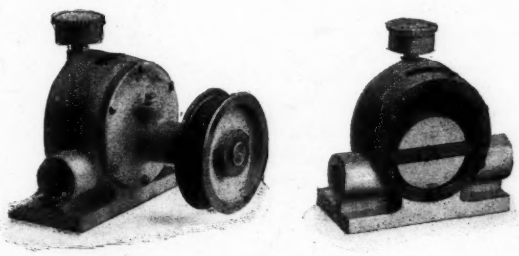
Cast-Iron Case, Tinned Copper Drum. Indicates $\frac{1}{100}$ths of 1 cubic foot. Fitted with Quadrant Cock and Seal Pot, preventing loss of gas.



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(Elevation.) (Section.)

Should be connected to Gas Exhauster so that speed of both is proportionate.

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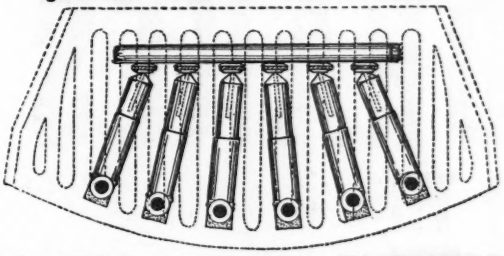

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Can be Adjusted to Shape of Grate and Gas Pressure *in situ.*

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The Exhaust Steam heats up the Tar and the Gas, and enables it to remove the maximum amount of Naphthalene. By removing the Tar, no Naphthalene is carried forward to the Scrubbers, except in strong and thorough combination with an **EXCESS** of light hydrocarbons, so evenly distributed and always sufficient in quantity to prevent the action of ammonia on the phenols liberating the Naphthalene dissolved by them.

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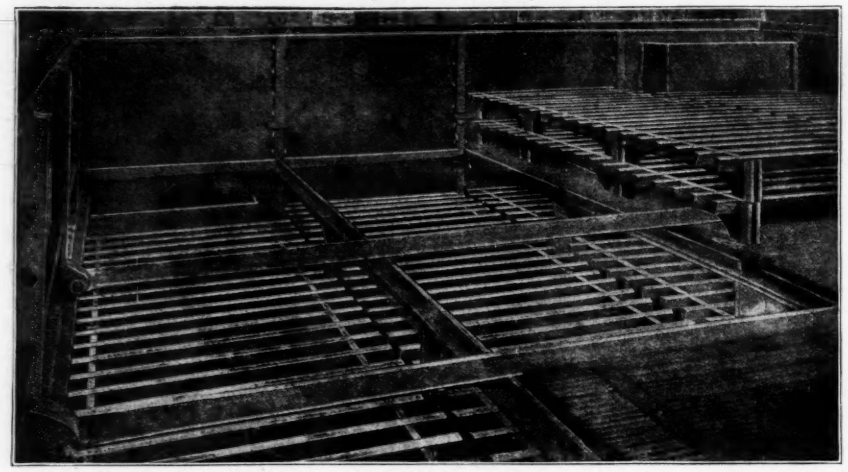

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WITH

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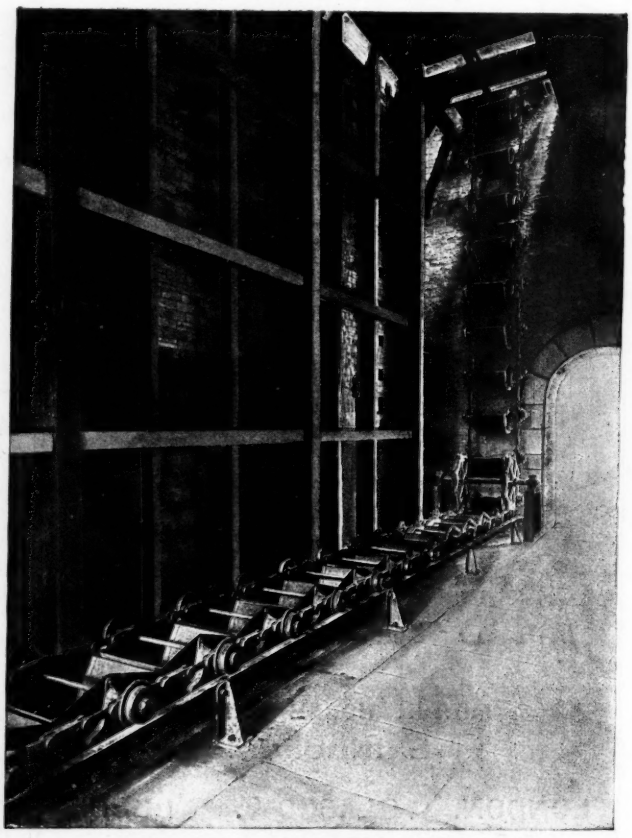

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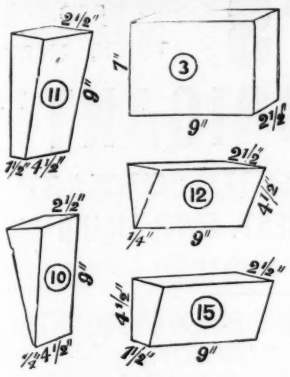
Contractors to a large number of the Principal Gas-Works.



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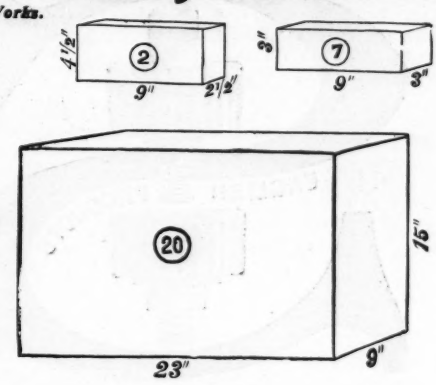
Without doubt the finest Materials in the Market for Gas-Works Furnaces.

BRICKS, BLOCKS, TILES, & SHIELDS of any shape made to order.



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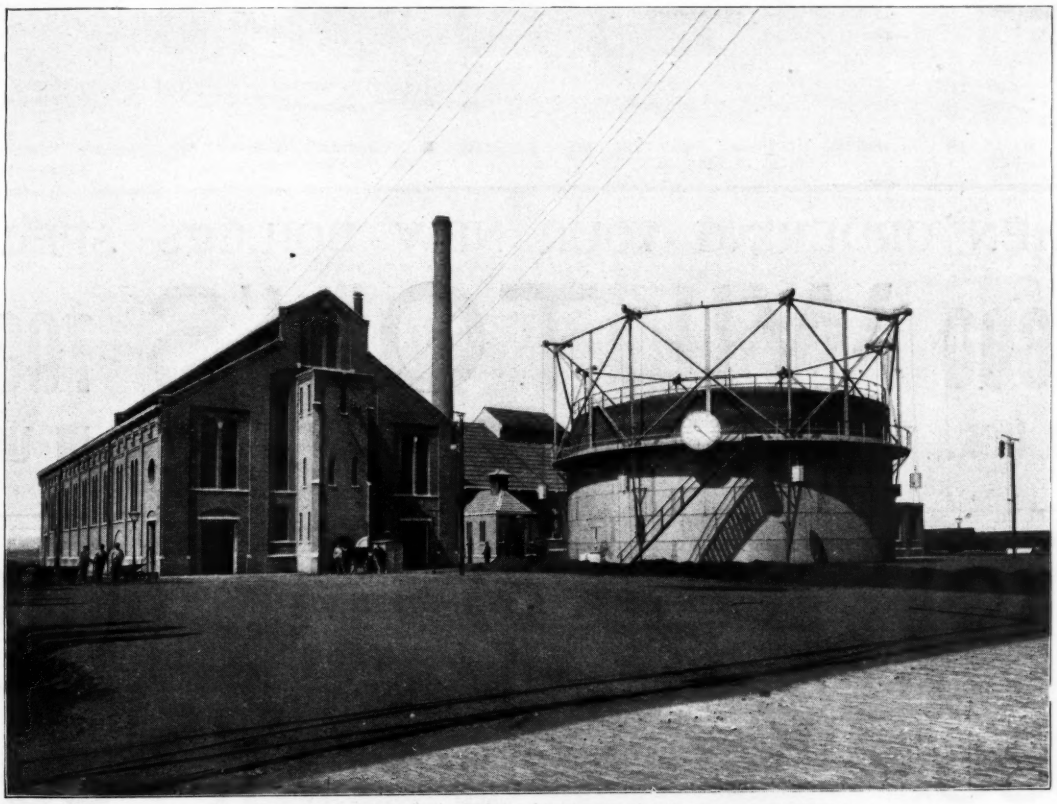
Telegrams: "WATERGASCO AMSTERDAM."



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PLANTS ERECTED AT THE FOLLOWING GAS WORKS OR ORDERED:

Amsterdam .	2,118,000 cubic feet per day.	Cadix . . .	125,000 cubic feet per day.
Zevenbergen .	125,000 ,, ,,	Venlo . . .	175,000 ,, ,,
Breda . . (Trial Installation).	452,000 ,, ,,	Uxbridge . .	100,000 ,, ,,

FURTHER INFORMATION FREE ON APPLICATION.

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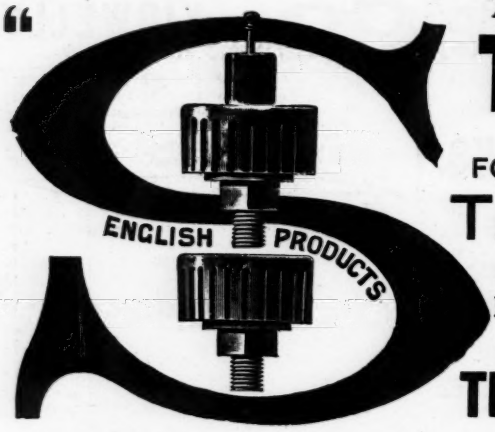

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CENTIGRADE FOR HOT PLACES **LUBRICANT"**

STANDARD MACHINE GREASE.

SAVING UP TO 90 PER CENT. OVER LIQUID OIL.

Patent "Unbreakable" & "Telltale" Stauffer Lubricators.

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12,000 PUMPS IN STOCK AND PROGRESS.

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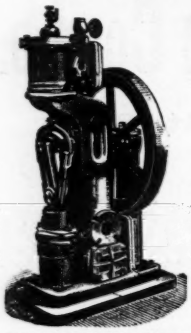

Fig. 705. "SINGLE RAM" STEAM-PUMP.

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

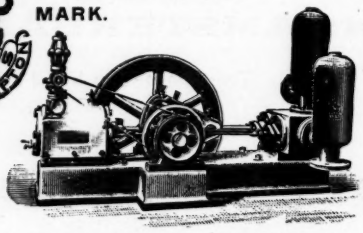

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

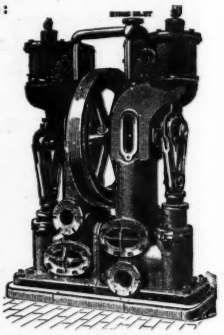

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

WHEN ORDERING YOUR NEW BOILERS SPECIFY

7000 WILTON'S 7000

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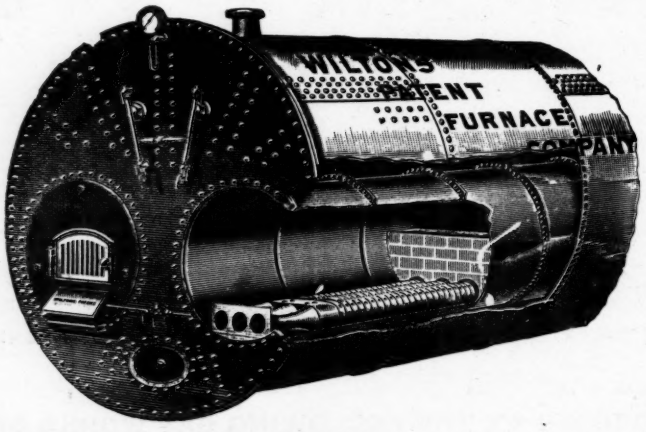

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EDITORIAL NOTES—GAS, &c.

The Metropolitan Gas Companies' Accounts.

IN another part of the present issue of the "JOURNAL" will be found the usual tabular statement of the accounts of the Metropolitan Gas Companies for the past year. It does not call for any detailed notice; but attention may be directed to a few of its features. The total capital engaged in the supply of gas in London on Dec. 31, 1905, amounted to £38,241,415; being £93,113 more than at the corresponding period of 1904. The additional amount was furnished by the Commercial and South Metropolitan Companies, as the capital of the Gaslight and Coke Company was reduced by £19,963. The income derived from the invested capital came to £6,095,590, and £4,581,295 was expended in earning it; leaving a gross profit of £1,514,295—being at the rate of £3 19s. 3d. per cent. on the capital, and £33 5s. 9d. per cent. on the gas-rental. For 1904, the latter figures were rather higher—being £4 7s. 2d. and £36 respectively. Turning to the second table, it will be seen that, conformably with a suggestion made by a correspondent last year, the results presented have been worked out on the basis of each 1000 cubic feet of gas sold, instead of, as previously, on each ton of material employed, which, owing to changed conditions of manufacture, had lost much of its value as a basis. The Gaslight and Coke Company stand highest, and the South Metropolitan Company lowest, in the matter of capital outlay, income, expenditure, and gross profit. Taking the mean of the three Companies, the figures are as follows: Capital, 21s. 2d.; income, 3s. 4⅛d.; expenditure, 2s. 6¼d.; and profit, 10d. The third table shows that last year there was a drop of £218,429 in the total revenue; £178,000 of it being attributable to residuals. On the other hand, the expenditure was reduced by £71,011. Thus the total loss was brought down to £147,417. The conspicuous item in this portion of the table is the decreased outlay by £57,279 on raw material.

The following table shows the carbonizing results of the three Companies, so far as they relate to the manufacture of gas from coal only. They do not vary to any great extent from those for the preceding year; but it may be pointed out that the yield of gas is in all cases higher—the mean per ton being 10,539 cubic feet, compared with 10,474 cubic feet in 1904.

TABLE *showing the Residuals produced and the Gas made per Ton of Coal by the Metropolitan Gas Companies in the Year* 1905.

Name of Company.	Coke.	Breeze.	Tar.	Am. Liq.	Gas.
	Cwt.	Bushels.	Gallons.	Gallons.	Cub. Ft.
GASLIGHT AND COKE .	12·53	5·85	9·98	30·97	10,307
SOUTH METROPOLITAN .	12·29	4·67	9·56	34·37	10,827
COMMERCIAL	12·25	6·05	11·36	33·71	10,754
Mean per Ton . .	12·41	5·41	9·92	32·48	10,539

Unity in Research and Commercial Work.

THE new President of the Southern District Association of Gas Engineers and Managers—Mr. F. W. Cross, of Lea Bridge—suffered a little disadvantage at the annual meeting on Thursday. It fell—as it might have fallen at any time during recent years—upon the opening meeting of his year of office to perform the final act in the passing of Mr. James W. Helps from the Honorary Secretaryship to the rank and duties of an ordinary member. It was a closing scene in which the central figure was a man naturally endowed with those gifts which, with earnest work, have from the beginning to the end of his eighteen years' tenure of office, caused it to be recognized the industry through that for such a position he is second to none. But upon the use of her endowments Nature imposes a limitation; and it is for health considerations only that Mr. Helps has been constrained to partially resign his voluntary work, in order to assist in preserving himself for the duties of his professional life which have greater and still growing claim upon him. Such men (as Mr. Ellery says) we want to live long. At the close of this extended and steadfast service on the part of Mr. Helps, the members presented him—not with a reward for services rendered (that were impossible), but with a handsome and tangible testimonial of esteem and affection, so as to memorize in Mr. Helps's family, in time to come, the place he occupied in the hearts and the service of men. It was this event—overshadowing all else in the thoughts of those present at the meeting on Thursday—that imposed a little disadvantage upon the President's Inaugural Address; but the President himself counted it as no mean gain and as an honour that he, on such an occasion, should be the mouthpiece of the members.

Adverting to the address, the President invested it largely with a commercial character—opening up one by one the passages of the work of the gas manager as distinct from that of the engineer. Business method has received a large amount of attention from Mr. Cross. He now wants, however, in the commercial affairs of the gas industry, that individuality shall be aided by both collective work and, as far as possible, by unification of method. But in leading up to his main point, Mr. Cross was a little unfortunate in his reference to the affiliation of the District Associations to the Institution of Gas Engineers; for, while he acknowledges that in affiliation—in unity—there is a potentiality that is not attainable by individual effort, reading between the lines of his utterances, the separation is evidently not a very wide one between him and those who regard affiliation as something in the nature of a mirage. He thinks that the Council of the Institution should (as it were) restate the case for affiliation. We do not think that is at all necessary or desirable. The benefits of affiliation are not likely to grow with the rapidity of the pantomime beanstalk; but we believe now, as we have from the first believed, that solid advantage will emerge from the identification of the District Associations with the Central Institution, and the territorial representation this gives them in the deliberations of the Council. The very presence of these District Association members on the Council suggests mutuality in all things pertaining to such an organization—not only in benefits, but in the initial work to create the benefits. We do not say that the presence of the District Association members on the Council has not availed anything to the present; but, so far as the veil has been lifted from the proceedings of the Council, it has not been forced upon the attention that the alteration in the composition of that body has yet led to any greater degree of initiation. It is not for the District Associations to open their mouths for the fruits without taking part in the planting. There can be no creation without an inchoate stage; and it is to this stage that the district members of the Council should first direct their attention. So far, they appear to have worked solely as independent units, and as ordinary members of the Council. But it may be suggested that the position they should take up should be just as much advisory as watchful. Mr. Cross has been sent to the Council as the Southern Association representative; and we would throw out the hint to him, in view of what he says in his address, that a practical step towards the district representatives being initiators and producers of good, would be for them to confer together, and go to the Council prepared with suggestions whereby, in their opinion, good can result from the welding

that has been effected of the interests of the Institution and the district organizations.

The President himself suggests in his address that affiliation paves the way for a devolution of research and general inquiry work from the Central Council to the Associations. It is Mr. Cross's opinion that the results of individual work have been small. We are of the contrary view. There is common agreement as to there being much work, requiring considerable time and money for its successful prosecution, that can only be done collectively and not individually, and can be carried out collectively without in any way stemming the current of individual and voluntary labour. But over all this hangs as a depressing cloud the ever-present question of funds. The Committee of the Southern Association, in the report which they presented last Thursday, unintentionally made one of the most incisive comments possible on the portion of the President's address where he talks about the Institution appealing for funds, when they said: "In view of the rapidly-diminishing balance of the special "fund subscribed for the purpose of this [the naphthalene] "inquiry, it has been decided to suspend operations until the "summer." The President has only to carry his mind back to the annual meetings so far held of the united Institution to remember that increased usefulness has been a constant theme and desire; but the first requisite—funds—for giving effect to the desire has been the subject of considerable and anxious thought, without much progress being made in the realization. It always has been, and we fear always will be, so long as existing circumstances prevail, a very difficult matter to enlist the sympathy and support of the administrators of gas undertakings in research work; and our firm conviction is, and has been for some time past, that until by some means—by a class of membership, perhaps—the Chairmen for the time being of Gas Companies and Gas Committees are brought into closer personal touch with the work of the Institution, there will continue to be a poor response to any appeal for funds for what appears to many of those who govern the purse-strings of our gas undertakings to be purely quests for something that is visionary, and therefore of no material value. An augmentation of funds is what the Institution require; and we can see no other way by which they will successfully realize the necessity than by extending the borders of membership and bringing the Institution's work directly, instead of indirectly, into contact with, and so to the cognizance of, those who dispense the contents of the coffers of gas undertakings.

From unity between the Institution and the District Gas Associations, and unity in technical research, the President was able to pass with freedom into the question of unity in commercialism. He would like to see something of the kind of commercial work that is already being done in the Manchester Institution district, and in that of the Eastern Counties Association, applied to the extensive area of the Southern Association, with development beyond the precedents. This is a matter in which those who go slowly will go farthest, and the aphorism may be suitably attached to the whole of this part of the President's address. He feels strongly that what is required is unification and uniformity among gas undertakings on the commercial side of their business, not only in respect of the purchase and sale of materials, but in business methods as between supplier and consumer. That is an ideal, against the reaching of which every gas undertaking can furnish obstacles. Better by far to stay at intercommunication and co-operation, with discretionary application of the so-derived information. No self-respecting administration would entertain the idea of binding themselves to unification of method; and unification in such things would, we are afraid, tend to curb individual initiation and resource. The time may be appropriate for the Institution to consider this question of co-operation in commercial work; but until there is a greater development of commercial sections in the Association areas, the Institution cannot possibly take in it any more than a parental interest, nor give to it any more than similar encouragement.

The address was full of vigorous thought on the various important topics referred to; and if anything comes of the suggestion in this article (which suggestion has been conceived by reading the address), that the district members of the Council of the Institution should themselves confer together in order to see what can be done in the way of better utilizing their position on the Council by initiatory work, Mr. Cross will not have written and expounded in vain his views on the subject of united effort.

Commencing Work at Westminster.

With all the cheerfulness that novelty and change engender, the new Parliament have settled down to the Nation's, and their own, business. Many fancy (though not all unique) ideas that have been hovering about the portals of our Legislative Houses have, with the new order of things, gained admittance, and have severally had their principles affirmed. Free meals for school children, free letters for our legislators, the payment of parliamentary election expenses, and the payment of Members of Parliament, have all received the gracious approval of the House of Commons, and have been set on one side for further consideration, when something more is known on the question of ways and means. Of more solid worth is the announced reference of the question of procedure in the House to a strong Committee, in connection with which revision may certainly be made with advantage. A Royal Commission has also been appointed to inquire into the canals and inland navigations of the United Kingdom. In the House of Lords, the Prevention of Corruption Bill has been read a third time, and has been passed to the House of Commons.

From matters of general concern to those directly emanating from the gas industry. Most of the Gas Bills have now been read a second time in the House in which they originated, several have been grouped, and one Committee of the Commons (who have no less than eight Gas Bills in their list) will commence their sittings to-morrow. The Committees are starting about a week later this session than last; and, as the Easter recess will commence the second week in April, they will not have a very long spell of work before their adjournment. The seed that was scattered in the hope that it would germinate into opposition in the House of Commons on the second reading of the Gas Companies (Removal of Sulphur Restrictions) Bill was wasted, as the stage was passed without the slightest sign of hostility. There are several petitions against the Bill arising out of the organized opposition, in which the blind are found leading the blind without any proper notion of how they are to reach their journey's end. There will be an instructive meeting between the Companies and the Local Authorities in the Committee-rooms; but there are long odds against the latter. Petitions have been lodged in opposition to most of the Gas Bills; but this is no criterion, at this stage of the session, as to the amount of work and adjustment that will be required in the Committee-rooms. The South Suburban Bill for 13-candle gas is one that is hardly likely to escape controversy before a Committee of one or both Houses; for there are no less than seven authorities ranging themselves in opposition. But Sir George Livesey and his fellow-Directors take a hopeful view of success on this occasion. The Ascot District Gas Company have had, in the Court of Referees, an interesting little brush with a private firm who are the promoters of a Provisional Order for giving them powers of electricity supply similar to those that the Gas Company are asking for in their Bill. The Gas Company objected to this private outside firm, whose object is a speculative one, having *locus* against their Bill, seeing that the Company are already established in the district and possess large interests there. However, the *locus* was allowed, though there is no guarantee whatever that, if the ultimate result is the defeat of the Gas Company's scheme and the success of the Provisional Order, the private firm in question, or rather a Company to whom they may transfer the Order on terms, will ever carry into effect the powers conferred.

Regarding the London Electricity Power Bills, the Government do not, so far, appear to be moving in the matter of the appointment of a Royal Commission to inquire generally into the supply of electricity in London; but a question was in the paper for last evening having for its purpose the eliciting of information as to the intentions of the Government. These may have changed since it was first rumoured that Mr. John Burns himself would move that the whole subject should be referred to a Commission. It is reported that the municipalists, since learning their strength in the House, have hatched a nice little scheme for extinguishing all the Power Bills save that of the London County Council on second reading. This would leave the Council the sole occupant of the field this session; but it would not necessarily mean the Council's success in carrying their Bill through the Lords. It is calculated that last session the Local Authorities of London spent about £100,000 opposing the

Administrative Company's Bill; and, if a Commission is not appointed and the municipal plot fails, the waste of money must be, with the several powerfully supported schemes in the field, greater in the present session. The City Corporation and several of the Borough Councils are favourable to the appointment of a Commission, in order that there may be no unnecessary squandering of money, and that no injustice to vested interests may be perpetrated. Meantime, the London Gas Companies and certain of the Suburban ones have lodged petitions against the several Bills, one of which, by the way—that proposing the generation of electricity in the Kent coalfields for the supply of London—has been withdrawn.

The Board of Trade and a Defective Sulphate Plant.

Any doubt that may previously have existed in connection with the circumstances surrounding the fatal boiler explosion at the Longridge Gas-Works some six months ago, has been dispelled by the inquiry held last week by two Commissioners on behalf of the Board of Trade. At the time of the inquest on the two victims, the Jury, in returning a verdict of "Accidental death," added a rider to the effect that, in their opinion, sufficient care had not been taken to see that the steam-outlets were kept from corroding, and also that there ought to have been some arrangement to show the pressure. The Board of Trade Commissioners, after an investigation extending over several days, have found that the Gas Company—who were liable in law for the neglect of any of their servants acting within the scope of their employment—failed to take proper measures to see that the boiler was worked under safe conditions. The Company were therefore guilty of negligence; and they have been condemned to pay £50 towards the cost of the inquiry. The boiler was used in connection with a sulphate plant, but the Commissioners stated that it was idle to attempt to differentiate such a boiler—in which steam was, in fact, generated—from a steam-boiler. They added the opinion that "great harm would be done if boilers forming part of the plant for the manufacture of sulphate of ammonia were allowed to be managed by unqualified persons, or were supposed to be in order without the necessary mountings and sufficient internal stays." The boiler in question was fitted with a tell-tale pipe which was intended to act both as a pressure-gauge and a safety-valve; but this tell-tale pipe was, at the time of the explosion, plugged, while the pipe connecting the still with the saturator was choked. The Commissioners found that the tell-tale pipe, though efficient as a tell-tale pipe when unplugged, would not, even if larger than was the case, have been sufficient to prevent a rapid accumulation of pressure; and they stated that there ought to have been a pressure-gauge of some kind. Mr. H. Lancaster, the Gas Manager under whose care the boiler was, and who was severely injured by the accident, admitted that he had not contemplated the vapour-pipe becoming choked with crystals, and that he never knew what the tell-tale pipe was for; and the Commissioners regretted that they could not exonerate him from blame for the explosion. They added, however, that "he faced the danger when it appeared," and that he had their complete sympathy. His mistake was that he undertook the management of the boiler, for which he was not qualified, in addition to the many duties of Manager and Secretary, for which he was well qualified. It is to be hoped that the accident, and the deplorable loss of valuable lives which it occasioned, will serve for all time as a warning as to the danger of allowing steam generating apparatus to be used under such conditions as prevailed at Longridge.

Carburetted Water Gas at Ipswich.

The alarmists have been busy at Ipswich over the question of safeguarding gas consumers from the supposed greater dangers of an admixture of a certain proportion of carburetted water gas with the coal gas supplied. One correspondent of a local paper summarizes Mr. William Newbigging's report on the relative advantages of large storage capacity and carburetted water-gas plant. Another correspondent dips deeply, and with tremendous gusto, into the report of the Departmental Committee of 1898, which (and this is the best comment that could be made on his published effort) has remained a dead-letter. This same correspondent suggests that the Gas Company should be hedged round by a number of conditions for the most part so impracticable that they would make it well-nigh impossible for the Company to carry on their business and fulfil the obligations imposed upon them by Parliament. This gentleman signs himself "D. P. H. (Cantab.), F.R.Inst.P.H., M.R.San.I." The string of letters, we suppose, are intended to inspire respect; but in our case they do not, though they may among a few people in Ipswich who are not "in the know." However, this gentleman who makes such an ostentatious display of "tail-lights" advises (putting his points briefly) that the public should be officially warned of the dangers of escaping gas; that all gas-stoves and cookers should be provided with flues, and no rubber connections be permitted; that there should be a periodical inspection of gas-fittings in houses by gas officials; that at no time should the Gas Company be allowed to supply pure uncarburetted water gas; that the Company shall be required by the Town Council to immediately inform them of the maximum and average admixture which it is their intention to adopt; that carburetted water gas shall not be added to the night supply of gas; and that "particular" attention should be paid to the laying of mains. Does "D. P. H." really think that the Ipswich Gas Company are not sufficiently acquainted with their business as to put rubber connections to gas stoves and cookers, or to go about the laying of gas-mains in a negligent fashion; whether he has knowledge of the obligations of the Company under their Act of Parliament, which render it impossible for them to supply "pure uncarburetted water gas;" and whether it has not struck him that the Ipswich Gas-Works would soon be closed by the rapid transfer of custom to electricity, if the Company attempted to give such a useless supply of gas for domestic purposes? The assumption of knowledge on the part of such newspaper correspondents as "D. P. H." is a real danger among the non-technical public. Otherwise his empty prating might go unheeded.

The Taxation of Machinery at Cardiff.

The successful appeal of the Cardiff Gas Company, at the Glamorgan Quarter Sessions, against the increased assessment of their works and mains, which was reported in the "JOURNAL" last week, was, it appears, one of several cases in which the Machinery Users' Association were able to afford their local members material assistance in obtaining reductions in the figures settled by the Assessment Committee. Prior to the appeals in question being reached, a number of objections were heard by the Committee; and though in several instances the increased rateable value was confirmed, in by far the larger number concessions were granted. This is all very satisfactory, so far as it goes; but the attitude of the Committee in this matter, and especially in regard to the rating of machinery, is not, it seems to us, calculated to improve the position of the town as a manufacturing centre. According to some correspondence which has taken place between the Secretary of the above-named Association (Mr. J. B. Caldwell) and the Clerk of the Committee, the latter body have declined to state specifically that they will not tax the machine tools and other furniture of the manufactories in their Union. Yet the Corporation, as well as that of the sister port of Newport, are making great efforts to induce manufacturers to establish their works in the town. It is true that the rates at Cardiff are low in comparison with some other places; but even at their present figure of 7s. 3d. in the pound, if the tenants' machinery is to be rated, the tax would be equal to about 35s. upon every £100 invested in such plant. This would be far worse than an income-tax of 1s. in the pound, because this is levied only upon accrued profits, and would amount to but 5s. per cent.; while local rates are a tax upon capital, and have to be paid when no profits are made. If municipalities wish to induce manufacturers to settle in their midst, they should state candidly how they propose to treat them in the matter of rating. The removal of works and plant into a new district is not a matter to be lightly undertaken; and in the absence of information on the point referred to manufacturers would be walking blindfold into a trap.

The Funds of the Labour Representation Committee.

Doubtless the nominees of the Labour Representation Committee who have succeeded in getting elected to Parliament, will breathe more freely now that judgment has been delivered in a test case tried recently at the Newport (Mon.) County Court, to decide the legality of Trades Unions making levies for the return

and maintenance of Labour Members. The defendants were the South Wales Miners' Federation, and the plaintiff a member of that organization—though it was admitted that the Merthyr Vale Conservative Club was behind him. The action was to recover 4s. alleged to have been illegally demanded; and an injunction was asked for to restrain defendants from making similar levies in future, together with a declaration that the Parliamentary Levy Rule was illegal. The plaintiff lost all along the line; but a stay of execution was granted on the application of his Counsel. The first unsuccessful argument was that the Trade Unions Act limited the objects of such bodies to dealing with relations between masters and workmen and workmen and workmen; and the second that the Levy Rule was contrary to "natural justice," plaintiff not holding the same political views as did the Member (Mr. Richards) he was called on to help support. Regarding the latter, however, the Judge pointed out that the rule provided that the representative should press forward "proposals conducive to the general welfare of the members of the Federation," and that this could be done irrespective of politics. So far as concerned the repayment of the money, he held that an action could not be brought, because defendants had not attempted to enforce the payments of any levy. The injunction, he said, would also be useless, as the Federation could get rid of it by making a rule and having it certified. But this part of the action failed upon another ground. If the object for which the levy was made was not illegal, and the manner in which it was made was not illegal in itself, although not provided for by the rules, the Court would not interfere at the instance of a member, as this was a matter concerning the internal management of the Federation. He held that the rule under which the levy was made was not illegal, nor contrary to the essential conditions and purposes of the Federation. Unless therefore the judgment is reversed on appeal, the alternatives before the plaintiff are those of either paying up and looking pleasant or of ceasing to be a member of the Miners' Federation.

Gas Supply in Australia.

The proceedings at the meetings of the two Australian Gas Companies which are reported in our present issue show that the industry is in as flourishing a condition on that side of the world as it is on this. In spite of the competition of the electric light which they have had to face, the output of the Australian Gaslight Company continues to steadily increase. The Chairman (Mr. G. J. Cohen) had, however, one thing to lament in connection with the accounts, and that is a matter which has too often to be the subject of complaint on the part of administrators of English gas-works—namely, the enormous amount of extra taxation they have been called upon to meet of late years. In addition to this, the Company have to pay a largely increased amount for labour, as the result of the appeal of the workmen to the Arbitration Court. Twelve months ago the Chairman estimated that this extra burden—3d. per day rise of wages as from Jan. 1, 1905, and a further 3d. as from Jan. 1 of the present year—would amount to £2400 for 1905, and about £5000 per annum as from the beginning of the present year. Under these circumstances, it is only natural that consideration of a reduction in the price of gas should be delayed. In regard to the Metropolitan Gas Company of Melbourne, this undertaking was declared by the Chairman (Mr. John Grice) to have made last year a bigger stride forward than usual. The increased dividend which was paid for the first time in the June half of last year is maintained on the present occasion, while a liberal allocation has also been made to the reserve fund. There was in 1905 an increase in the sales of gas of 5 per cent. as compared with 1904; but the outstanding feature of the report submitted to the meeting a few weeks ago is the fact that, while the receipts for gas showed an increase of £12,670, and residuals of £3241—or a total rise of £15,911—the additional quantity of coal carbonized was only 4225 tons, costing, with purifying material, labour, and sundries at works, an extra price of £2639. This excellent result, the Chairman pointed out, was due to the newer machinery employed and the improved methods of carbonization adopted, which had justified the very large expenditure that had from time to time been made. It will be noticed that, in the course of his address to the shareholders, Mr. Grice compared at some length the relative positions occupied by the Melbourne Company and various English undertakings in the matter of unaccounted-for gas.

THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 757.)

THE Stock Exchange had a somewhat chequered time last week, but came out of it triumphantly at the end. There was some dullness at first, which was, however, soon dissipated by a brighter outlook in South African and Moroccan quarters. The fall of the French ministry was the next event, and this administered a momentary check. In the meantime, the fortnightly settlement was in course—a process which was not wholly free from anxieties. Lastly came the reassuring reports from Algeciras; and this, coupled with the successful negotiation of the settlement at the cost of only one small failure, imparted a tone of cheerfulness which was heightened up to the close. In the Money Market, there was a good demand; and rates for short loans and discount held very firm. Business in the Gas Market opened with a flourish, and gave promise of much activity. But after a couple of days of this, it tamed down considerably; and the rest of the week was not up to average. The general tone was excellent, and several quotations advanced. There has lately been too much fiddling about of some quotations, putting them up or down one day, and then reversing the operation a day or two later; and when this operation is applied to issues of great strength and character, it is scarcely commendable. In Gaslight and Coke issues, the ordinary was very active at first, and fairly so later on. Transactions on Monday touched 99¼, on Tuesday the quotation was lowered, and on Wednesday the price was got down to 98. Then on Friday the quotation was put up again; and on Saturday the stock changed hands at 99¼ once more. The secured issues were strong and active. The maximum was done at from 88½ to 89½ (the quotation rising 1); the preference at from 105½ to 108½ (a like rise of 1); and the debenture at 89¼ and 89¾. Moderate business in South Metropolitan showed transactions at prices ranging from 128⅛ to 129¼; and in ditto debenture from 87½ to 89½ (a rise of 1). Commercials were very quiet. The 4 per cent. marked 114¼ and 115½; the 3½ per cent. 111¼ free; and the debenture 85 and 85¾. In the Suburban and Provincial group, there were a large number of *ex div.* changes; but business fell back into its old quiet groove. British was done at 43¼ and 43⅝, South Suburban at 125 *cum div.*, Tottenham "B" at 101 and 102¼ *cum div.*, and West Ham debenture at 104. Business was a good bit slacker in the Continental Companies. Imperial (which was put up the week before and was now put down) marked from 233 to 234. European (which was put down the week before and was now put up) marked from 22½ to 23⅜, Union was done at 131, and ditto preference at 147. Tuscan marked 10¼ and 10 3/16. Among the undertakings of the remoter world, Bombay was done at 7 and 7 1/16, and Oriental advanced 1. Cape Town changed hands at from 17 to 17 7/16, ditto debenture stock at from 100½ to 101¼, Monte Video at 12⅜, Buenos Ayres at 12¾ and 13. Primitiva ordinary at 7 1/16 and 7¼, ditto preference at from 5 3/16 to 5 7/16, ditto debenture at 99⅛, River Plate at 13 3/16 and 13¼, ditto debenture at 98¾ and 99, and San Paulo (which announces a higher dividend) at 14⅜.

The closing prices are shown in our Stock and Share List on page 757.

ELECTRIC LIGHTING MEMORANDA.

The Dividends of the London Electricity Companies—Some Reductions—The Activity of Gas Competition—The "Understanding" by Consumers of Electricity Leads to Economy—Power Bills and Power Business—The Toll of Local Mismanagement.

INSTRUCTIVE are the accounts of the London Electric Light Companies for the past half year. We have been looking forward to their publication with special interest on this occasion, as Sir William Preece was recently referring to his "poor gas friends" who were struggling "very hard to obtain dividends," one of the principal officials of the Charing Cross, West End, and City Electricity Supply Company was also threatening the gas companies with a surprise, and an electrical paper was chuckling over the small percentage rate of increase in consumption that the Gaslight and Coke Company scored. With the publication of the Electricity Companies' accounts, the truth is out. The Gas Companies have had the funds wherewith to pay their full dividends; the Electric Light Companies have not, and certain of them have given their shareholders a less return on their investments than in the previous year. As to the surprise promised by one of the high officials of the Charing Cross Company, we hope for the shareholders' sake that it is not the reduced dividend of 5 per cent. that they are receiving this time, and the information that, through a heavy expenditure on false hopes, they have an unproductive capital expenditure, in connection with the City part of the undertaking, amounting to £370,000. The shareholders are disappointed; and among the (for the Directors) discomforting inquisitorial speeches made at the recent meeting was one by no less an authority than Professor Ayrton, who twitted the Board on their sanguine

spending propensities and prophecies of the past, and remarked upon the gloomy outlook of the shareholders at the present time. On the City part of the undertaking, after payment of interest, the earnings have not been sufficient, by £2272, to meet the preference dividend. The West-end part of the concern has had an increase in the sales of current by only £4900. We will later on deal with the reasons given for the reduced dividend, as they—accounting for slow financial progress—apply generally to the Companies. The St. James' and Pall Mall Company have declared a 12½ per cent. dividend for the year; but the Directors regret that the funds will not admit of the payment of the bonus. The Westminster Company, too, are paying 13 per cent., against 14 per cent. in 1904. The Central Electric Supply Company, who generate current for the two last-mentioned Companies, are not paying any dividend at all. The Metropolitan and the Kensington and Knightsbridge Companies are paying 10 per cent. (but no 2 per cent. bonus in the case of the latter Company this year); the City of London, the County of London, the Chelsea, and the Notting Hill Companies, 6 per cent. each; and the London Electric Supply, the South Metropolitan, and the Smithfield Market Companies, 4 per cent. each. Therefore, from the shareholders' point of view, things are not so rosy as they might be.

There have been some candid statements at the meetings of the Companies as to the causes of the slow rate of progress and the decline in the amounts available for dividend. The attraction of electricity is on the wane; and Chairmen have made a clean breast of the fact. At the Chelsea meeting, the Chairman acknowledged that the smallness of the increase was due partly to the reduction in the demand by some of the large consumers, and partly to the falling off in the building operations in the district. Reduction in charges compelled by strenuous competition, heavy parliamentary expenses, increase of rates, and the absence of fogs are among the causes of the decline in financial progress. A less requirement of electricity for heating cannot have made an appreciable difference; and we have not observed that this has been advanced. Moreover, it is only just recently that the prices have come down to 1d. per unit in an attempt to boost business in this direction. The Chairmen of certain Companies made no secret of the seriousness of the unremitting competition of gas. The reductions in price tell a tale, without words. But the Chairman of the St. James' and Pall Mall Company frankly admitted that "the past year had been one of exceptional difficulty, anxiety, and labour for all connected with the electrical industries. Competition by gas had been most energetically pushed; and they had felt bound to meet it by corresponding efforts on their own part." The South Metropolitan Electric Supply Corporation freely acknowledge that a substantial reduction in price was made "in order to meet the severe competition of the Gas Company." Two reported versions of a statement by the Chairman of the Charing Cross Company are distinctly interesting, both in their variations and in their substance. Readers may compare them:—

Electrical Review.	*The Electrician.*
Another reason for the drop in dividend was that, although business had been moving, and they had been making progress, gas competition and competition all round, and the fact that the public were beginning to understand electric lighting and to use less of it, had had a downward tendency as to the prices they could obtain; and consequently to the profit they could get.	Then the second reason for the dropping of the dividend is this—that, although business has been moving, and we have been making progress, there has been competition all round, and the fact that the public are beginning to understand electric lighting, and to economize in the use of it by efficient control, has had a disastrous tendency—first, in the price we could obtain, and, secondly, in the profits we could get out of the price obtained.

What more eloquent testimony could be wished for as to the success of the trading methods and the perseverance of the gas companies; and this result in one of the most promising parts of London for electrical business! No wonder one of the chief officials of the Charing Cross Company—apparently fretting under the knowledge of disappointing results for the year—recently, in his angry mood, let fall prophetic statements into the willing ear of a reporter of a halfpenny newspaper as to pending vengeance on the gas companies. It will be observed that in one version of the above, the word gas has been omitted. In the other report, "disastrous tendency" is rendered as "downward tendency." The important point, however, is that the electricians are now realizing that the public are "beginning"—how slow their education has been!—to "understand electric lighting" and to "economize" in the use of it. The number of consumers who have returned to gas owing to the expensiveness and indifferent lighting power of the glow lamp, indicates that the "beginning" of the "understanding of electric lighting" is not a modern occurrence. The economizing, as already seen, is confirmed by the Chairman of the Chelsea Company. From these considerations, the conclusion may be drawn that the Olympian Electrical Exhibition did not give the expected impetus to the electric lighting business in London; and, as a matter of fact, the reports of the Companies' meetings do not show that the great event has been referred to as a notable feature of the half year.

Quite a feature, however, has been made at the meetings of the Companies of the power business that is being done by them. There is shrewdness in this. The work before the Companies in the present Parliamentary Session weighs heavily upon them, with both Company and County Council promoted Power Bills to contest. The defence of their interests which the Companies made last session was an expensive matter for them; and they have now to take to the field again, to resist a greater number of promoters. The Westminster Company incurred an expenditure of no less than £4200 in fighting in the Committee rooms last year. The City of London Company have had to put £7500 to a suspense account in respect of these parliamentary expenses. Other Companies no doubt suffered in like proportion, and to useless result, unless the prolongation of the contest which prevented the Administrative Company's Bill receiving the Royal Assent was worth the money then expended. The Companies are naturally very desirous that the whole question shall be referred to a Royal Commission, and it must be the decided view of every disinterested man that this is the best for all parties that could happen. There is one excellent thing last session's fighting did for the Companies, and that is it laid bare the strongest case that could be made for the Power Companies, and showed wherein their own opposition was weak. They will go better prepared to Parliament in the present session, if the Government allow the Bills to be prosecuted in preference to arranging for an inquiry by Royal Commission. In most—probably by now in all—cases electricity is being sold for power purposes at 1d. per unit, or thereabouts. The Companies may not be able to justify the figure; but it is evidence that they are putting their backs to the door to keep out fresh power competition.

As before remarked, power supply was made the principal point at the meetings. The shareholders of the London Electric Supply Company were informed that the total costs, in their own case, were now down to 0·95d. per unit—the generating costs (without rates and taxes, distribution costs, &c.) being 0·62d. per unit. The Chairman stated that the Company can already supply at ¾d. per unit. The 0·95d. does not quite confirm the statement; and the prospect is that rates and taxes and other expenses are almost sure to advance. The ¾d., however, is the price at which the Administrative Company were suggesting last session that they would be able to supply in some three years' time. The London Electric Supply Corporation also assert that 59 per cent. of the current supplied by them last year was used for power; the South Metropolitan Company say that 40 per cent. of their output represented power business; and nearly a quarter of the energy distributed in the West-End district of the Charing Cross Company is said to be employed for power use. At the Westminster meeting, it was declared that last year, for driving motors and cooking and heating, the Company sold more units than they did eleven years ago for all purposes; and the Chairman hopes that the Company will be as successful "in competing with the Gas Company in this class of business as they have been in lighting." These declarations exhibit the seriousness of the position of the Companies if the power business is handed over either to one big Company or to the County Council. But they are not going to lose it lying down. And as for competition, it is quite sufficient for them to have the Gas Companies proving to customers that, for most purposes, the gas-engine is cheaper and more convenient than an electric motor.

The London Gas and Electric Light Companies are companions in grievance over the amount of the rates that local government demands of them. The pull of the rates upon the already strained financial resources of the latter has been bitterly bemoaned at almost all the meetings of the Companies. It could not have been cheering to the shareholders of the Westminster Company to learn that, on the new valuation, there is an increase of rates of no less than £7000 a year, or over 60 per cent.; and that, as this takes effect from March, there will be over £5000 more to pay this year than last—this being equal to 1 per cent. dividend on the ordinary shares. The London Electric Supply Corporation have had their assessment put at £25,000, against £8000. In the case of the Chelsea Company, the Chairman is responsible for the statement that an amount equal to 25 per cent. of the divisible profits goes to the rates, or a sum equivalent to one-third of the dividend. The quinquennial valuation has also issued in the "individual property" of the Notting Hill Electric Company being raised in value for the purposes of rating from £4598 to £7656. We need not multiply the examples. Whatever the enterprise, such a state of things cripples effort to do the best possible for the public; while, on the other hand, the electricity undertakings of certain of the Municipalities in London are favoured by unjust assessments in the contrary direction. It is a heavy toll that private enterprise has to pay for local maladministration.

At the recent annual meeting of the Institute of Chemistry, Dr. Percy F. Frankland, F.R.S., Professor of Chemistry in the University of Birmingham, was elected President for the current year. In referring to the matter, the retiring President (Mr. David Howard) mentioned that Dr. Frankland had long been associated with the Institute, of which his father, the late Sir Edward Frankland, was the founder and first President. Among the members of the new Council are Mr. Arthur Smithells, B.Sc., whose name is well known to our readers from his investigations into the nature of flame, and Mr. F. Napier Sutton, who is one of the District Inspectors under the Alkali Acts.

ACCOUNTS OF THE METROPOLITAN GAS COMPANIES FOR THE YEAR 1905.

—	Gaslight and Coke.	South Metropolitan.	Commercial.	All the Companies.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Capital and borrowed money (including premium capital)	27,533,882 11 9	8,145,445 0 0	2,562,087 17 9	38,241,415 9 6
Income—viz.:				
Total gas-rental	2,996,667 14 4(a)	1,195,433 2 2(f)	356,999 0 7(d)	4,549,099 17 1
Rental of meters and stoves	70,883 13 10(b)	116,615 19 11	35,824 4 8	223,323 18 5
Residual products	712,474 16 0	483,122 16 1	91,796 18 7	1,287,394 10 8
Miscellaneous, including old materials	22,051 17 0	12,876 12 10	843 6 3	35,771 16 1
Total income from all sources	3,802,078 1 2	1,808,048 11 0	485,463 10 1	6,095,590 2 3
Expenditure—viz.:				
Coal and oil, including carriage and dues	1,210,155 1 10	649,775 9 7	160,376 12 1	2,020,307 3 6
Purifying materials, including labour	88,649 16 4	37,724 17 11	9,266 0 2	135,640 14 5
Salaries and wages—manufacture	289,136 15 6	144,154 3 10	40,328 11 3	473,619 10 7
Wear and tear—manufacture	366,881 2 10	197,097 1 4	57,333 16 1	621,312 0 3
Rents, rates, and taxes	307,334 11 9	82,215 5 4	22,025 3 0	411,575 0 1
Salaries—management	15,359 11 4	6,742 15 9	2,243 12 2	24,345 19 3
Collectors' salaries and commission	48,858 8 3	24,965 11 6	6,200 2 2	80,024 1 11
Stationery, printing, and general charges	20,036 14 3	20,993 7 9	4,224 12 0	45,254 14 0
Directors and auditors	5,929 8 0	5,138 15 9	2,650 0 0	13,718 3 9
Salaries and wages, wear and tear—distribution	235,481 5 0	95,278 16 8	23,313 16 5	354,073 18 1
Repair and renewal of meters and stoves, &c.	128,219 7 9	92,790 16 1	29,136 2 6	250,146 6 4
Law and parliamentary charges	9,965 16 9	7,551 9 2	956 7 2	18,473 13 1
Bad debts and extraordinary expenses	62,998 15 7(c)	59,143 14 8(g)	10,661 0 7(e)	132,803 10 10
Total expenditure on revenue account	2,789,006 15 2	1,423,572 5 4	368,715 15 7	4,581,294 16 1
Gross profit	1,013,071 6 0	384,476 5 8	116,747 14 6	1,514,295 6 2
Do. per cent. on capital and borrowed money	3 13 7	4 14 5	4 11 2	3 19 3
Do. do. gas-rental	33 16 2	32 3 3	32 14 1	33 5 9

(a) Including £136,871 received for public lighting and gas supplied by contract. (b) Stoves only. (c) Including annuities, £45,633, and £1683 on workmen's compensation account. (d) Including £13,242 (less discounts and allowances) for public lighting, &c. (e) Including £6043 paid under the profit-sharing scheme. (f) Including £29,583 for public lighting, &c. (g) Including £12,860 paid to pension, &c., funds, and £42,092 paid under the co-partnership scheme.

TABLE *showing the Capital, Income, Expenditure, and Profit per* 1000 *Cubic Feet of Gas Sold in* 1905.

—	Gaslight and Coke.	South Metropolitan.	Commercial.	All the Companies.
	s. d.	s. d.	s. d.	s. d.
Capital and borrowed money	26 2·35	13 5·00	17 1·89	21 1·91
Income—viz.:				
Total gas-rental	2 10·21	1 11·63	2 4·69	2 6·21
Rental of meters and stoves	0·82	2·30	2·88	1·48
Residual products	8·13	9·55	7·38	8·55
Miscellaneous, including old materials	0·25	0·25	0·07	0·24
Total income from all sources	3 7·41	2 11·73	3 3·02	3 4·48
Expenditure—viz.:				
Coal and oil, including carriage and dues	1 1·82	1 0·84	1 0·89	1 1·41
Purifying materials, including labour	1·01	0·75	0·75	0·90
Salaries and wages—manufacture	3·30	2·85	3·25	3·14
Wear and tear—manufacture	4·19	3·90	4·61	4·12
Rents, rates, and taxes	3·51	1·62	1·77	2·73
Salaries—management	0·17	0·13	0·18	0·17
Collectors' salaries and commission	0·56	0·50	0·50	0·53
Stationery, printing, and general charges	0·23	0·41	0·34	0·31
Directors and auditors	0·07	0·10	0·22	0·09
Salaries and wages, wear and tear—distribution	2·69	1·88	1·88	2·35
Repair and renewal of meters and stoves, &c.	1·46	1·83	2·31	1·66
Law and parliamentary charges	0·11	0·15	0·08	0·13
Bad debts and extraordinary expenses	0·72	1·17	0·86	0·88
Total expenditure on revenue account	2 7·84	2 4·13	2 5·64	2 6·42
Gross profit	11·57	7·60	9·38	10·06

TABLE *showing the Increase or Decrease in each Item during* 1905 *compared with* 1904.

—	Gaslight and Coke.		South Metropolitan.		Commercial.		All the Companies.	
	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.
	£	£	£	£	£	£	£	£
Capital and borrowed money	..	19,965	62,745	..	50,333	..	93,113	..
Income—viz.:								
Total gas-rental	..	56,116	..	9,091	3,840	..	..	61,367
Rental of meters and stoves	5,051	..	7,592	..	5,628	..	18,271	..
Residual products	..	119,685	..	49,842	..	8,536	..	178,063
Miscellaneous, including old materials	2,454	..	303	..	..	27	2,730	..
Total income from all sources	..	168,296	..	51,038	905	..	..	218,429
Expenditure—viz.:								
Coal and oil, including carriage and dues	..	45,448	..	3,993	..	7,837	..	57,279
Purifying materials, including labour	..	11,400	..	4,495	..	950	..	16,846
Salaries and wages—manufacture	..	17,435	..	127	573	..	..	16,989
Wear and tear—manufacture	16,446	..	..	30,256	..	3,531	..	17,342
Rents, rates, and taxes	6,572	..	6,007	..	2,650	..	15,230	..
Salaries—management	876	..	543	..	43	..	1,462	..
Collectors' salaries and commission	178	..	1,121	..	598	..	1,897	..
Stationery, printing, and general charges	..	2,005	..	1,440	136	..	..	3,309
Directors and auditors	..	6	..	58	..	..	..	64
Salaries and wages, wear and tear—distribution	1,450	..	..	12,068	2,270	..	..	8,347
Repair and renewal of meters and stoves, &c.	4,697	..	..	2,285	4,711	..	7,123	..
Law and parliamentary charges	6,092	..	23	..	..	366	5,749	..
Bad debts and extraordinary expenses	10,557	..	7,340	..	..	194	17,704	..
Total expenditure on revenue account	..	29,426	..	39,688	..	1,897	..	71,011
Gross profit	..	138,870	..	11,350	2,802	..	..	147,418

FUSING OF ELECTRIC CABLES A PUBLIC DANGER

Illustrated by the Upton Park Occurrence.

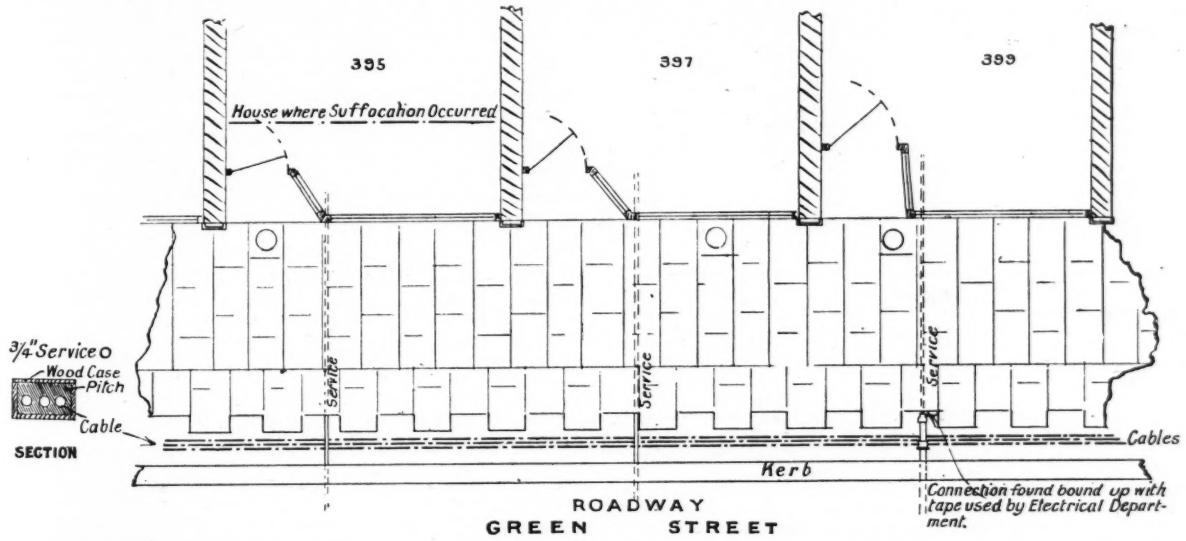
ELECTRICIANS have at times been found to be particularly adept at shifting, by plausible tales, responsibility from their own shoulders on to other people's, and preferably on to those of their principal competitor. These tales sometimes look fair enough until the facts are sifted, and then the absurdity of the thing is often stripped of its gossamer cloak. Last week, Mr. Samuel Glover, in our "Correspondence" columns, was referring to a grave occurrence at Upton Park, which caused five or six persons to suffer seriously and several others in a minor degree, owing to, there seems to be no doubt whatever, the fusing of an electrical cable, and the escape of noxious fumes into two or three houses, —one particularly, where the occupants were rendered insensible—in Green Street.

There is no question that between 20 and 30 feet of the electric cables in this street did fuse, because it is freely admitted by the Borough Electrical Engineer (Mr. Ullman); and when, on smoke being seen to be issuing from the pavement, the electrical officials were summoned, and the current was cut off, all danger was apparently at an end. But the fumes occasioned by the pitch-embedded cable had meantime found their way not only through the pavement cracks, but into the adjoining houses; and an hour after the fusing of the cables was discovered, there was an alarm by the occupier of the house (Mr. David Reed) where some half-dozen people had been rendered unconscious. Medical men were at once sent for; and on their arrival all, except Mr. Reed himself, had to be removed to the Passmore Edwards' Hospital.

Nobody appears to have questioned, at the time, that the trouble had any source, or contributory source, other than the fused electric cable. But since then Mr. Ullman has been trying (according to the report of an interview in a local paper) to connect the West Ham Gas Company with the occurrence—attributing the beginning of it, and the subsequent results, to his rival—gas. Naturally the accident and Mr. Ullman's statement have had some disconcerting effect in the neighbourhood. What he has said may have a wider circulation; and the injury, without it is disproved, may not remain local.

We will give Mr. Ullman's statement as published, and deal with its points afterwards to show the hollowness of his assertions. Mr. Ullman said:

> Over 80 per cent. of the cables in connection with electric lighting systems in the United Kingdom are bedded in the same way as is the East Ham system; and it is a perfectly safe system. It is true that between 20 feet and 30 feet of the electric cable had fused; but no fumes from the bitumen insulation could possibly have entered the upper portion of the house. In the first place, the fumes and smoke given off by bitumen are considerably heavier than air, and would accordingly sink, instead of rise. In the second place, fumes given off by bitumen are perfectly harmless. Then it is also known that in times of smallpox and scarlet-fever epidemics men working with bitumen boilers are immune.
>
> In my opinion what really happened in this case was that a large escape of gas had destroyed the insulating properties of the bitumen round the cables, causing them to ignite; and the fumes, mixed with gas, found a passage to Mr. Reed's cellar, and thence all over the house. Had there been no escape of gas, the accident would not have occurred.



In the same issue of our local contemporary, appeared the report of an interview with Mr. Reed, who, with his family and the other inmates of the house, so nearly lost their lives. In the course of his statement, he remarked:

> I said to my missus: "There's something the matter; get up and get a light." *The missus lighted the gas.*

This is a statement that at once shows how much reason there was for a technical man of Mr. Ullman's position making the statement for which his interviewer gives him credit as to the "fumes, *mixed with gas*," finding a passage to Mr. Reed's cellar, and thence all over the house. An hour had elapsed after the electric current was cut off from the fused cable before the alarm was given by Mr. Reed; and assuming Mr. Ullman to have been correct, and that there really was sufficient coal gas in the house to suffocate the people, on the striking of a match the effects would have been more serious than they were, and Mr. Reed would probably not have been alive now to tell the tale of how his wife set light to the gas-jet without causing an explosion. It is one of the strongest pieces of evidence the Gas Company could have to rebut the curious assumption to which the interviewer appends Mr. Ullman's name. Then if there had been a "large escape of gas," why did it wait until the electric cable fused before getting into the neighbouring houses. There is, in the recorded interview, another statement which is contradictory. Mr. Ullman asserts that the fumes and smoke given off by bitumen would sink instead of rise. The constable who first discovered that something was wrong states that smoke was seen issuing from the pavement, which ordinary people would understand to mean a rising and not a sinking. Then, as observed above, Mr. Ullman says the fumes mixed with gas found their way all over the house—which is again a rising, and not a sinking; and if Mr. Ullman's theory is correct, the fumes ought to have refused to mix with the gas, being of such a weighty character.

In order to further elucidate the matter, we have obtained from Mr. John Clark, the Chief Engineer and General Manager of the West Ham Gas Company, a sketch of the position of the electric cables relatively to the gas service-pipes and the adjoining houses; and reference to that drawing will completely exonerate gas from participation in this matter, and leave something for Mr. Ullman either to retract or further explain. The first intimation that the Gas Company had that they were mixed up in the matter in any way by the Electrical Department was on Wednesday morning, the 28th ult., when a telephonic communication from that source stated that there was a split gas service-pipe in Green Street. The position of the gas service-pipe alleged to have been split relative to the house from which the persons were rescued in an unconscious condition will be seen in the drawing. On the intimation being received, a man was immediately despatched by the Gas Company to remove the service-pipe; and when he got there, he found it bound up with tape like that used by the Electricity Department. Thinking there was no doubt about the service being split, he unfortunately removed the pipe before taking off the tape, and making an examination. But after the disconnection, he unfastened the tape, and, not finding any damage to the pipe, replaced it—perfectly sound—just as it was before. The joint that was bound up was not interfered with in any way; and this was pointed out to the men who were engaged in replacing the electric cable. The service supposed to have been split is about 25 feet from the house where the people were nearly suffocated; so that, according to the opinion of the Electrical Engineer, the escaping gas—if there had been any—must have performed wondrous things: It must have found its way through the wood casing, the pitch surrounding the cable, the cable covering, and set fire to it without a light; and then, still as wonderful, it would have had to pass through the burning mass to get into the house 25 feet away. When it did get there, ashamed of the evil it had already wrought, it refused to explode on Mrs. Reed lighting the gas-jet in the room from which shortly

afterwards she was rescued in an insensible state. The application of a little common sense discloses the absurdity of Mr. Ullman's story.

We have no doubt that this gentleman has since discovered the true cause of the accident, and has, it is hoped, taken the necessary steps to prevent a recurrence. If not, everybody will agree that there is great danger if such things can depend upon a slight escape of gas (no escape of gas is admitted in this case) from a service 6 inches above a box containing some electric light cables, with the space packed solid with pitch. Gas is a marvellous thing; but——

MUNICIPAL ACCOUNTS.

THE conference convened by the London Chamber of Commerce in connection with the recent appointment by the President of the Local Government Board of a Committee to inquire into the systems of municipal account-keeping and to advise, was held yesterday week. The notice calling the meeting stated that the object was to discuss "the recommendations of the Joint Parliamentary Committee on Municipal Trading, 1903, and the best means of securing their adoption as regards the independent professional audit of municipal accounts and the standardization of such accounts."

According to the Chairman (Mr. Felix Schuster), the gathering included the representatives of 48 chambers of commerce, 18 industrial and other associations, and 20 municipal corporations and local authorities. Prior to the conference, the following questions were issued to those bodies: "(1) Do you or do you not agree with the recommendations of the Select Committee on Municipal Trading, 1903? and (2) Do you or do you not agree that it is desirable that a standard form of accounts should be prescribed for all municipal bodies?" The replies in favour of the recommendations of the Select Committee numbered 91—being from 32 chambers of commerce, 44 local authorities, and 15 industrial and other associations; while 21 local authorities were conditionally in favour of the recommendations. Against the recommendations were 29; three of the replies being from chambers of commerce, and 26 from local authorities. The replies in favour of standardization numbered 107, with an additional 11 conditionally in favour. Against standardization, there were 18 replies, 17 of which were from local authorities.

The following resolutions were passed at the conference:—

(1) That this conference, representing chambers of commerce, industrial associations, municipal corporations, and local authorities, expresses its regret that effect has not been given to the recommendations of the Joint Select Committee on Municipal Trading as regards appointing independent professional auditors of municipal accounts.

(2) That this conference is convinced of the desirability of securing as far as possible the standardization of municipal and local accounts on business lines, and recommends that, so far as practicable, such accounts be kept on the basis of income and expenditure, and also that trading and profit and loss accounts be prepared yearly of the various commercial undertakings of such authorities.

(3) That this conference, while welcoming the Departmental Committee recently appointed to inquire and report with regard to "the systems on which the accounts of local authorities in England and Wales, &c.," should be kept, is of opinion that it should be strengthened by the addition of independent members connected with practising accountancy, having regard to the recommendations of the Joint Select Committee on Municipal Trading.

(4) That a deputation from this conference wait upon the President of the Local Government Board, to urge upon him the necessity for giving effect to the recommendations of this conference.

ACETYLENE AND COAL GAS.

COMPLAINT was made at the recent meeting of the Acetylene Association of libels on the particular commodity and apparatus in which the members deal; the Chairman at the meeting (Mr. F. L. Rawson) declaring that "the rival illuminants continued to abuse them." There was no specific instance of libel or abuse on the part of coal-gas people granted by Mr. Rawson into which inquiry could be made; and therefore it has not been possible to ascertain how far his allegations were justified. "People who live in glass houses should not throw stones;" and it would be a rational thing on the part of the Acetylene Association to see that those engaged in the sale of acetylene plant are virtuous in their statements before complaint is lodged as to the assertions of rivals. A correspondent sends us a circular issued by the Manchester Acetylene Gas Company, Limited. Whether this Company are connected with the Acetylene Association, we cannot say. However, in their circular they remark—

The best quality carbide of calcium yields from 4·8 to 5 cubic feet of gas per pound; and, in making comparisons, it must be understood that the illuminating power of 1 cubic foot of acetylene is equal to that of 15 feet of coal gas—an acetylene burner giving a light of 50-candle power consumes 1 cubic foot of gas per hour, while an ordinary coal-gas burner, giving a light of 16-candle power consumes 5 cubic feet per hour. At the present price of calcium carbide, the cost of acetylene may fairly be taken as *not higher* than coal gas at 2s. 9d. per 1000 cubic feet.

The prevarication of the authors of this statement will be plain to every reader of the "JOURNAL," but not so to the general public for whom the circular is intended. The comparison is made with the old flat-flame burner, which most gas consumers have long since discarded, and which, where they may still be in use, the gas industry are diligent in recommending should be superseded by incandescent gas-burners. In the statement of relative value, we have it that acetylene compares with coal gas at 2s. 9d. per 1000 feet on the basis of illuminating power, taking 5 cubic feet per hour as giving 16 candles, which we confess must be a decent sort of coal gas to do that in a flat-flame burner. But taking this basis, we find that 1000 cubic feet of gas costing 2s. 9d., will give—consumed in flat-flame burners, at the rate per hour of 5 cubic feet each—a total of 3200 candles. This, then, is also the illuminating value obtained for 2s. 9d., using acetylene at the present cost of carbide of calcium. Taking ordinary "C" incandescent burners—not special or inverted burners—giving only 18 candles per cubic foot of gas consumed per hour, a total illuminating power of 18,000 candles can be obtained from the consumption per hour of 1000 cubic feet. Where, therefore, is the justification for the statement of the Manchester Acetylene Gas Company, Limited? If telling the whole truth will not assist them in their competition with coal gas, then they would do better not to publish comparisons likely to trap the unwary and the unintelligent. We commend this instance of a libel on coal gas to the notice of the Acetylene Association, and trust they, or Mr. Rawson, will take early steps to repudiate such tactics in competition.

PERSONAL.

The Liverpool Corporation have appointed Mr. ALFRED G. SMITH, the Assistant Lighting Engineer, to the position of Superintendent of Street Lighting, Official Inspector of Gas and Electric Meters, and Gas Examiner, at a salary of £400 per annum, as from Jan. 1 last. It will be remembered that the vacancy arose through the death of Mr. C. R. Bellamy, which was recently recorded in the "JOURNAL."

The recent annual meeting of the Bristol Water-Works Company was marked by the retirement of Mr. EDWARD BUSH from the position of Chairman. In thanking the shareholders for the courteous way in which they had always received him during his long connection with the Company, Mr. Bush mentioned that he was elected a Director in 1857, and that since 1888 he has acted as Chairman. His place is taken by Mr. H. NAPIER ABBOT.

Readers will doubtless remember that rather more than a year ago the Batley Corporation lost the services of their Gas Engineer (Mr. J. F. Bromley) under painful circumstances—his death resulting from suffocation by gases escaping from the sulphate plant. The Gas Committee asked the son of the deceased—Mr. ARTHUR BROMLEY—who had filled the position of Assistant Engineer and Manager for about six years, to carry on the work temporarily. We now learn that he has been definitely appointed to the post occupied by his late father.

In a previous issue of the "JOURNAL" we announced the resignation of Mr. B. BARK, the Manager of the Godalming Gas Company. On leaving the Company's service, Mr. Bark was presented by the staff with a handsomely framed enlarged photograph of himself and the donors. The presentation was made on their behalf by Mr. G. Walker, the works foreman. In thanking them for the gift, and introducing Mr. W. LISTER, who has been appointed Working Manager, Mr. Bark had the pleasure of informing him that there was not an employee who had not been with him at least seven years.

The death has taken place of Mr. C. Brierley, of Bury—a gentleman who gave up a great portion of his time to public work for the town. Among his other offices, he represented Bury on the Mersey and Irwell Joint Committee, and held the office of Deputy-Chairman. He was also Chairman of the Water-Works Committee; and on the formation of the Bury and District Joint Water Board, in 1900, he was appointed the first Chairman.

A riveted steel force main, 30 inches diameter, which was laid across salt marshes five years ago, to bring an additional water supply to Atlantic City (N.J.), has developed a considerable number of leaks due to rusting through the shell, which is protected by burlap and mineral rubber. The conditions are very severe on a pipe in this location, owing to the corrosive action of the salt water and the organic matter of the marsh; and it is accordingly proposed to remove the present protection, and replace it with several inches of portland cement mortar reinforced with steel wire or mesh.

A process and apparatus for producing a new gaseous mixture for gas-engines and other purposes has been patented in America by Mr. C. K. Harding. According to the "Engineer," the most novel feature of this invention is the use of catalytic action to break up kerosene and heavy hydrocarbons into the lighter hydrocarbons of the same series. This destructive distillation and partial oxidation of kerosene is effected by passing the oil-vapour mixed with air through a red-hot tube of some refractory material carrying metals of the platinum group in an extremely fine state of division.

THE ELECTRICAL TRADES' DIRECTORY.

We have received from the "Electrician" Printing and Publishing Company, Limited, of Salisbury Court, Fleet Street, the "Electrical Trades' Directory and Handbook"—familiarly known as the "Big Blue Book"—for the current year. This is the 24th year of publication, and every possible effort has been made to bring the contents of the present edition as close up to date as the exigencies of printing would permit. The volume includes notes of last year's progress in electric traction and power, a sketch of the development of the steam-turbine, and of the progress made in electric lamp improvements, &c.; and a complete summary of parliamentary work during the past session, so far as the legislation has affected the electrical industry. The law of electric lighting, power, and traction, telegraphs and telephones, is fully dealt with; and a digest, specially prepared by Mr. A. C. Curtis-Hayward, Solicitor, is given. The subject of patent law and expiring patents, rules for the installation of electric light, power, and traction in this country, the fire risk rules of all the leading Fire Offices, as well as those which govern electrical installations in the United States, Germany, France, Switzerland, and other Continental countries, as well as in the British Colonies, are included in the volume. Full financial details relating to electrical joint-stock enterprise, and ample information relating to the financial side of every branch of the electrical industry, are to be found in the book, including a Directory of Directors of Electrical Companies, particulars of the capital authorized and issued, the last dividends paid, the latest Stock Exchange quotations, and all the principal officials. The "Directory Division" contains the name and address of every person engaged in the electrical profession and industry throughout the United Kingdom. There is included a "Biographical Division," giving sketches of the careers of the leaders of electrical engineering enterprise at home and abroad, and a complete obituary for 1905. Finally, a graphic survey of the engineering and electrical equipment of all the electricity supply, electric power, and electric traction undertakings of the kingdom is given in the form of five large tables—the details presented being very comprehensive. One of the tables is devoted to Colonial undertakings of the same character. There are in all upwards of 2000 pages in the "Directory," which for nearly a quarter-of-a-century has occupied a prominent place as a book of reference for an important industry, international in character; and the present edition shows that there is no slackening of the Editor's efforts to keep up the high reputation of the work.

TAXATION OF GAS-METERS IN ITALY.

Proposed Increase.

The Italian Parliament, in the month of December last, proposed a modification and extension of the existing taxation on meters, which is already sufficiently onerous, especially when the additional levy of 2 c. or 3 c. per cubic metre of gas is remembered. The latest proposal takes the form of a fee for the first verification of a gas or a water meter, with an additional fee whenever the meter may be moved or refixed. These provisions are embodied in clause 5 of the Bill, which further enacts that the verification shall be made where the meters are manufactured, adjusted, or supplied from; and that a proper laboratory must be furnished, together with all necessary apparatus. Perhaps if this were all, not very much could be urged against the proposals; but when the Bill goes on to say, in clause 8, that all gas and water meters are to be subjected to a compulsory verification every five years, it calls for the strongest protest and condemnation. The scale of charges varies from 1 to 50 lire (10d. to £2) for the original testing, according to the size of the meter; while for the periodical verification, the tax proposed ranges from 3 to 10 lire (2s. 6d. to 8s.). Infringements of the conditions of the Bill would render the suppliers of meters liable to fines of 25 to 100 lire (£1 to £4).

Though the Government which brought in this amazing scheme of taxation has, within the past few weeks, been superseded, nevertheless the proposals remain to some extent; and therefore it behoves gas companies in Italy (and there are many in which English capital is invested) to be prepared to make a successful and emphatic protest. From a circular-letter sent out by the Italian Gas Association, we learn that it is intended to have a full discussion of the matter at their annual meeting at Milan some time in August. The circular points out that such taxation would be an unwarrantable interference, not only with gas undertakings, but with the consumers, who are already taxed more for their gas than anywhere else in Europe. It would also further increase the unfairness of the competition with electricity; for electrical current is not taxed at all, nor are the meters for it subjected to any verification whatever.

Our Italian contemporary "Il Gaz," in its January issue, contains an article on this subject from the pen of Signor Camuzzi. He ridicules the idea that such legislation was required to safeguard the interests of the consumers, which is the plea put forth for the Bill; and he shows that any periodical verification will necessitate special apparatus, workmen, gas consumption, registration, and other formalities, the expense of all of which will fall on the unhappy consumer, in addition to the tax itself. The cost of a 5-light meter is about 40 lire (32s.), and for a 10-light meter about 50 lire (£2). The first requires to have a stamp of 4 lire and the second one of 8 lire, which represents 10 to 16 per cent. of the value of the meter. The additional expenses to be incurred, as above, would amount to at least 5 lire; and it may well be asked if it is reasonable to have to spend 9 to 13 lire for the sake of taxes of 4 to 8 lire. The larger the meter, the worse would be the result. A 100-light meter costs about 275 lire (£11), and the stamp comes to 80 lire (£3 4s.), or 30 per cent. of its value. At Milan there are about 100,000 meters in service. The average cost of the stamp may be taken at 6 lire (5s.) per meter. Every five years, 20,000 of these meters would have to be removed and verified, which would mean 120,000 lire (about £5000), besides which there would be all the accessory expenditure and the special staffs of workmen.

Enough has certainly been said to show how unjust and how oppressive any such taxation would be, and how it would throw into confusion one of the most important of the public services, increase the cost of gas, handicap the industry even more than at present, and interfere grossly with the individual consumer's rights and privileges. We cannot think that such legislation will have any prospect of success in the present Italian Parliament, nor, we should hope, in any future one.

THE WATER QUESTION AT DEVONPORT.

Both the Devonport Corporation and the Water Company are to be congratulated upon the approaching settlement of the long-standing dispute over the price to be paid for the Company's undertaking. The sum at stake—£58,207—was sufficient to justify the stubborn legal fight which has been waged for the last three years, and which might have continued for three years more if the issue had not been compromised. As it is, we are afraid the Corporation will be found to have made only a very indifferent bargain for the ratepayers. The ground upon which they were induced to propose the municipalization of the water-works was the alleged need of an improved supply, including the construction of a large storage reservoir, and the substitution of pipes for the open leat which carries the water from its source on Dartmoor to the town. The need for these improvements will not be the less because the undertaking is transferred to the Corporation. In several dry summers, Devonport has undoubtedly been short of water, and has only been saved from serious discomfort because the Company have been able to obtain some water from the Plymouth Corporation. Of course, the Devonport Corporation may continue to do what the Company have been doing in the past; and so long as it has water to spare, Plymouth will probably not object to the arrangement. This, however, will do nothing towards improving the Devonport supply; while to carry out such works as were at one time contemplated, means a large addition to the capital of the undertaking, and probably to the water-rentals. The most economical course would no doubt be the amalgamation of the Plymouth and Devonport water-works; but there is faint hope of any arrangement of this kind being sanctioned by either of the Corporations. Though they have many interests in common, the two towns cannot agree upon joint institutions or any kind of partnership. Devonport will therefore have to make the best it can of its water undertaking, and spend, in addition to the £244,000 paid for the works, whatever may be necessary to bring them into a condition to supply the requirements of the borough. In one direction, the Corporation seem to have rather unnecessarily shut themselves off from the prospect of an increasing revenue. If they are to act upon their contention in the arbitration, they will surrender to the Admiralty the right to an unrestricted use of their water upon the nominal terms which the Government of the day had inserted in the Company's Act of 1793. In the Corporation's own interest, it might have been worth their while to have had this point decided against them; for it seems tolerably certain that the Admiralty's requirements will increase rather than diminish, and the large amount they would pay for water, if charged upon the same scale as other consumers, would have reimbursed the Corporation for the immediate capital outlay, and left a margin of profit.

Trade Disputes in 1905.—An article in the last number of the Board of Trade "Labour Gazette" gives some preliminary figures on this subject, which are open to revision in the annual report. The article says: "The comparative freedom from trade disputes which has been noticed for some years past, continued in 1905. While, however, the amount of industrial disturbance, as measured by the aggregate duration of the disputes, was less last year than in any of the ten years 1893-1902, it was considerably more than in 1904, and somewhat more than in 1903. The total number of disputes recorded as commencing in 1905 was 337, affecting 92,768 workpeople; while the aggregate duration of all disputes in progress during the year was 2,446,271 working days. The number of workpeople involved was less than 1 per cent. of the industrial population, and this percentage would be still further reduced if agricultural labourers and seamen were included, as few strikes and lock-outs occur among these people. Spread over the same industrial population, the amount of time lost through industrial disputes was only about one-quarter of a working day per head in the year."

VERTICAL RETORTS FOR THE PRODUCTION OF ILLUMINATING GAS.

By William Young, of Peebles.

[Second Article.]

As having a bearing upon the carbonizing of coal in vertical retorts for the production of gas, it may be convenient here to explain that great difficulty was experienced in using bituminous coking coal in the retorts last described, owing to its softening during the carbonizing process, and forming a solid mass which greatly impeded the passage of the steam and gases through the charge. In the subsequent patent—No. 5084 of 1882—we explain that "we overcome that difficulty by the regulation of the feeding of the mineral into the retort, whereby the decomposition goes on quickly and continuously, and the formation of a semi-solid plug of mineral in the retorts is avoided." Mechanical arrangements are shown for accomplishing this object.

On the shale retorts being heated to the necessary temperature, the lower chamber and the firebrick sections of the retorts were primarily filled with spent shale, and the iron sections and the hopper were charged with the shale to be distilled. As soon as the oil vapours appeared at the hopper-doors, the valve on the downtake pipe leading from the hopper to the collecting main was

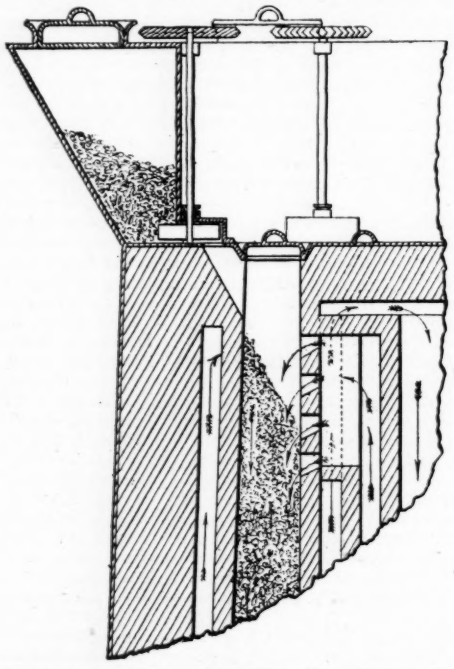


Illustration from Patent Specification No. 5084 of 1881.

opened, and the exhauster at the terminal of the condensers was started. At the same time, steam was introduced into the chamber underneath the brick retorts. Both the quantity of steam and the exhaust were increased as the distillation progressed; but the exhaust upon the top of the hoppers, never exceeded 2-10ths or 3-10ths of an inch of water—that being found sufficient to draw away the products and the necessary quantity of steam through the residues.

On the distillation of the first charge of shale in the iron section of the retort approaching completion, the self-sealing door on the chamber under the fire-brick retorts was slightly loosened; and if the steam did not escape round the edges, more was turned on until it did so. The door could then be fully opened with safety, as the steam acted as a lute or seal, and prevented the ingress of air—much in the same way that the gas formed a lute to the bottom of the coal retorts, as previously described. A quantity of shale residue was then withdrawn, which allowed the whole column of shale and residues in the retorts and hopper to drop a stage; and the partially emptied hopper was refilled with fresh shale. On the permanent gases from the shale at the outlet from the condenser and the scrubbing arrangements proving to be sufficiently free from air to be non-explosive, it was sent back and burned in the ovens around the retorts.

After a period of from four to six hours, a further quantity of shale residues was withdrawn from the lower chamber, allowing a further drop of the column of shale residues and shale. Fresh shale was thereupon charged into the hopper; and by the time five or six discharges of spent shale and charges of fresh shale had been made, the retorts were in their normal working condition—that is, the lower chambers were filled with the red-hot exhausted shale residues; the fire-brick sections of the retorts were filled with the residues or coke of the shale dropped out of the metal section; the metal sections were filled with shale from the hoppers; and the hoppers were filled again with fresh cold shale.

The steam used was that collected from the sulphate of ammonia saturators and the exhaust from the steam-engines about the works, supplemented by live steam if necessary to make up the whole equivalent to 8 cwt. to 10 cwt. per ton of shale distilled. This steam was dried, and freed from suspended moisture by passing through the pipe-heaters placed in the upper chambers, and containing the metal section of the retorts; and it was introduced, as previously described, through a series of ports near the bottom of the lower chambers. In passing upwards through the red-hot residue—the steam was itself highly superheated—at the same time cooling the residues ready to be discharged. The steam so superheated, on coming into contact with the shale, coke, or residues contained in the highly-heated fire-brick sections, was partially decomposed by the fixed carbon—producing water gas and liberating the nitrogen present as ammonia, and which was protected from decomposition by the presence of the water gas and the excess of steam.

The steam, after being thus heated and used to eliminate the ammonia from the shale, had the heat which it contains usefully employed in assisting the distillation of the shale occupying the iron section of the retorts, which were heated externally by the products of combustion from the fire-brick section. The steam and water gas further perform the useful function of taking up in diffusion the oil vapours as they were eliminated from the surface of the shale, carrying them upwards, and protecting them from further decomposition.

To still further utilize the sensible heat in the large volume of steam and products, they were made to pass on their way to the collecting main up through the newly-charged and cold shale lodged in the hoppers. The shale was thus heated, while the oil vapours were filtered free from mechanical impurities, partially condensed, and redistilled; and the resulting oils were thereby improved in quality.

The practical results from these retorts, worked upon these principles, were excellent.

Although the temperature of the heat that had to be applied to the fire-brick section of the retorts in order to obtain the ammonia was very high—1600° to 2000° Fahr. (very similar to that in gas-retorts), compared with 1000° to 1200° Fahr. which had been previously used to simply distil the shale for oil, yet the extra high temperature was in part compensated for by the fuel value of the water gas resulting from the gasification of the carbon in the shale residues during the ammonia-getting process. The close grouping of the retorts, so as to reduce loss of heat by the lessened area of the outside walls in relation to the through-put of shale; the counter-current principle of using the heat to effect the distillation of the shale and the treatment of the residues; and the economical method of obtaining the requisite supply of steam—all resulted in even less fuel being required than by any other method. The yield and quality of the crude oil was quite equal to that obtained by any other process; and that of ammonia was practically doubled. The only difficulty experienced (involving extra care and attention) was the liability, previously referred to, of the shale residues after being denuded of their carbon to flux at the high temperature it was found necessary to apply to the fire-brick section of the retorts in order to get the heat to pass quickly enough through the walls to heat up and effect the decomposition of the steam required for the elimination of the ammonia.

The other advantages arising from the Young and Beilby principles were, however, so very great that these retorts were rapidly introduced into most of works in Scotland, and continued to be used—substantially as originally constructed—up to the early nineties, when these retorts were much enlarged and altered in construction, mainly with the object of overcoming the difficulty experienced from the fluxing of the shale residues in the fire-brick section of the retort, and further reducing the cost for manual labour.

The first step in these structural improvements was made by Mr. N. M. Henderson, of the Broxburn Oil-Works, who (retaining the rectangular cross section of the fire-brick retorts) greatly increased their length, so as to give the shale residues a much longer time in the retorts and exposed to a larger heating surface. In this way, he proportionately reduced the temperature of the heat it was necessary to apply to the retort-walls to effect the ammonia-getting process. Mr. Henderson also introduced into the lower ends of the retorts a mechanical discharging device, by which the column of shale and the residues in the retorts were kept in constant motion—thus still further guarding against fluxing by local heating. Patent specification No. 26,647, of 1901, gives drawings and description of Mr. Henderson's latest and most improved design for mechanically discharging the residues.

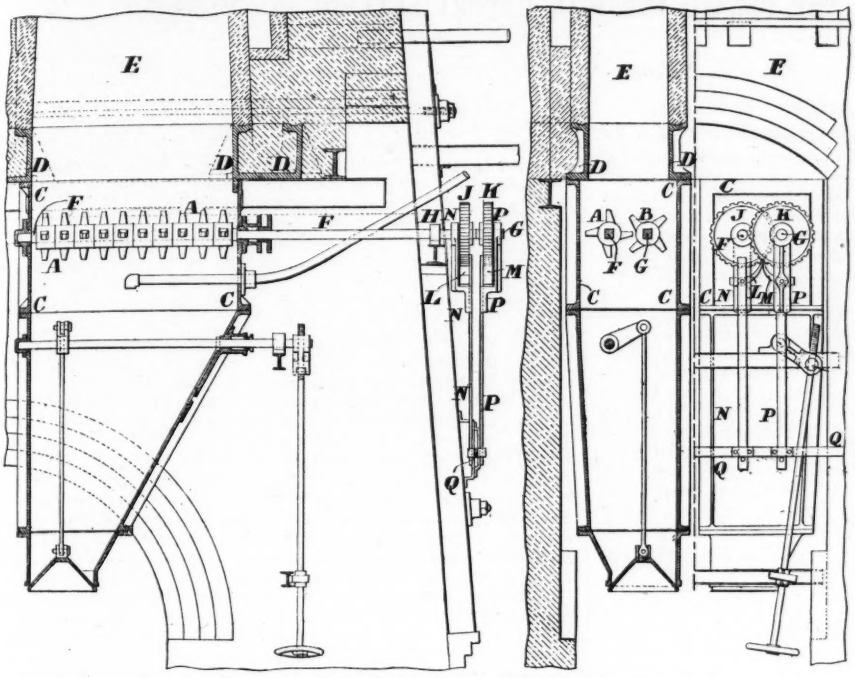


Illustration from Patent Specification No. 26,647 of 1901.

[Extract from Patent Specification No. 26,647 of 1901.]

The patentee says: In my earlier specification, a single toothed roller is employed in each retort for the purpose of withdrawing the exhausted earthy residues therefrom; but according to my present invention, each retort is furnished with a pair of toothed rollers for the same purpose. The two toothed rollers, A B, are fitted to work in the box C, attached to the two bottom girders D, carrying the retorts E; the box being made wider than the retort so as to give room for rollers of sufficient size and strength to properly support and deliver the material resting on them in the retort. The rollers are fixed to shafts F G, which extend out to the front of the retorts, being supported at their outer ends by suitable bearing blocks H. The roller shafts have fixed to their front or outer ends ratchet wheels J K, which are worked by pawls L M, fitted to levers, N P, loose on the shafts, and having their lower ends connected to a rod, Q extending along the front of the retort-bench. The rod is reciprocated by any suitable means, and its reciprocation works the ratchet levers N P, so as thereby to drive the rollers A B in opposite directions as required.

The next modification of structure in these retorts was made by Mr. James Bryson, of the Pumpherston Oil-Works, and with similar objects. Mr. Bryson abandoned the rectangular cross section of the retort, owing to a tendency of the shale to clog in consequence of the extra friction caused by the corners; and he adopted the circular form—considerably enlarging the cubical contents of the retorts, so as to give the shale a longer time to receive the heat through the proportionately less heated retort-wall surface. Like Mr. Norman Henderson, Mr. Bryson ensured that there was a continuous motion of the materials within the retorts, by providing the bottom of the retorts with an ingenious arrangement for the continuous discharge of the exhausted shale residues.

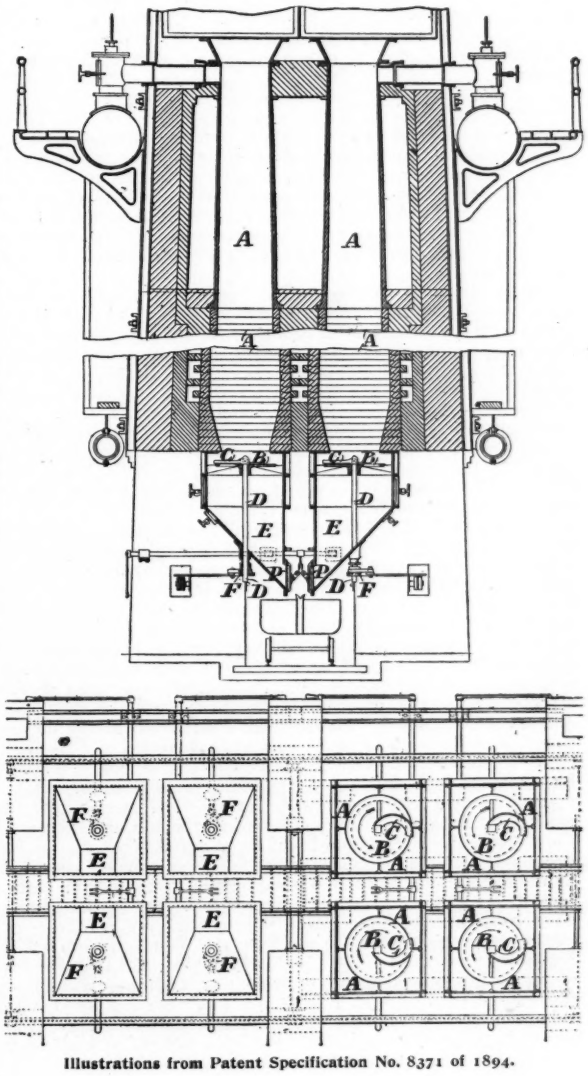
It was this modification of the retort that was selected by Mr. W. R. Herring as structurally the best suited for the carbonizing of bituminous coal for the production of gas, and which was illustrated in the "Journal" for Jan. 16, modified in structure for the purpose he had in view, by (amongst other things) being provided with a mechanical discharging arrangement for the coke through the medium of a water-lute.

My experience of such water-luted discharging arrangements, and of the working of the different forms of mechanical arrangements for the continuous discharge of the spent coke or residues from the lower end of the retorts into the receiving chambers from which it can be intermittently and periodically discharged through a self-sealing door, leads me to favour the latter method. And as I believe that this arrangement of Mr. Bryson's is, with slight modification, eminently suited for use with circular retorts, I might, for the information of readers, reproduce the drawing and description of the arrangement as originally devised by Mr. Bryson, given in his patent specification No. 8371 of 1894.

[Extract from Patent Specification No. 8371 of 1894.]

Figs. 2 and 3 illustrate retorts used in the distillation of shale. We preferably construct the retort A as a circular retort, having its lower end formed as a taper, or dimished in diameter, so as to present no corners to the material being treated during its downward passage, as is the case with the rectangular form of retorts at present in use. To ensure the downward passage of the material within the retort, means are provided whereby the material within the retort is kept intermittently, continuously, or nearly so, in a state of agitation or downward movement—that is to say, at the lower end of the retort is mounted a disc or table B, in such a manner as to support the material within the retort. The table has mounted above it a suitably-shaped arm or scraper C capable of being revolved by means of the upright spindle D, which preferably works through the centre of the table. The arm or scraper is so formed or shaped that, on it being revolved, a certain amount of the material resting upon the table is swept over the sides into the hopper or outlet chamber E mounted underneath. The arm or scraper may be revolved by ratchet and pawl arrangements F or by worm gearing, mounted on the outer lower end of the upright spindle D, which protrudes through the bottom of the hopper—there being suitable stuffing boxes and glands provided for the spindle. The rotation of the arm or scraper C thus causes the material in the retort to be intermittently, continuously, or nearly so on the move downwards. By such movement the tendency of the material to flux or dander within the retort is prevented or greatly reduced.

(To be continued.)



Illustrations from Patent Specification No. 8371 of 1894.

A CRITICISM OF THE DESSAU VERTICAL RETORT SETTING AND WORKING.

By Thomas Settle, of Exeter.

Without reservation, I admit (as a preface to what follows) the great technical interest attaching to the published results of the working with the Dessau form of vertical retorts. But beyond that it is impossible for me to go—in the first place because the results so far put before the gas engineering world have little about them that is striking or definite; and, in the second place, because, in my opinion, grounded on a lengthened experience in many trials, I am not satisfied that the Dessau method of working is fundamentally right. It will be my endeavour in this article to show, by a critical examination of as much information as has been vouchsafed, my reasons for so believing. Here I may make one complaint and it is that, for the purpose of affording gas engineers a thorough examination of the system and working, those who have been exploring the Dessau system and are now apparently endeavouring to commercially exploit it, have shown such moderation in the particulars they have advanced that, in certain directions, one has to have recourse to somewhat ponderous methods to obtain the information that is desired to estimate the value of the results. It is not my intention to do anything more in this article than to take the points that appeal to me, and deal with them in a practical way, so that they may be readily tested or overhauled at the will of those who are generally interested as engineers, or who have the more immediate interest in the matter of those who profess belief in the system to the extent that they have adopted, or are adopting, it.

Area and Capacity.—In dealing with this subject, I am at once brought face to face with the difficulty to which I have given expression in the preceding paragraph, as to the want of further information. While we are told that the area covered by the Dessau setting of ten retorts is 16 ft. 10 in. by 15 ft. 4 in., or 258 square feet, and that the retort is 13·1 feet long. No mention is made of the top and bottom diameters of the retorts themselves. Therefore, one is at a loss to know what is the cubical capacity of the retort. We are, however, informed by Dr. Bueb that the charge is 10 to 11 cwt. Taking the larger quantity—and reading with it the statement that "the retorts are filled with coal, allowing no free space above"—we get a capacity of 24·15 cubic feet, allowing 51 lbs. per cubic foot as the weight of the fine coal. Then the statement, "The sliding out of 8 cwt. of hot coke apiece" gives a capacity of 24·21 cubic feet, and a retort still full of coke occupying 1 cubic foot for every 37 lbs. That the vertical retort is always kept full of something, and every cubic foot of its capacity is occupied, is a great advantage over the horizontal or inclined systems. Seeing that twelve retorts produce 170,000 cubic feet of gas per day of twenty-four hours on a ground space of 263 square feet, and only an average of 11,459 cubic feet per ton of 12·3-candle gas (see the Mariendorf results), the immense possibilities of a system which gives an increase upon these figures of 15 to 20 per cent. in volume and slightly higher illuminating value, may be imagined.

Temperature of the Settings.—The figures given as to the temperature of the settings at Dessau are very high; so high that it called forth the remark from Professor Lunge that "he had been somewhat disconcerted when he heard that such a high temperature prevailed in the lower part of the retort;" and he would have feared two disadvantages therefrom—viz., "that the retorts would not last so long, and that the gas would be impoverished." Dr. Bueb states that the temperature entering the setting is 1400° C. (2552° Fahr.). But as the figures by Herr E. Körting distinctly show, the temperature—described by Dr. Bueb as "very high internally"—is exceeded in the Mariendorf setting; the highest temperature reached being 1465° C (2669° Fahr.).

Dumping in Coal and the Question of Temperatures.—Beyond a possible saving of labour and wear and tear of machinery, there is no more object in "dumping" a charge of coal into a vertical retort than there is in filling up a disused gravel pit. The very low illuminating power obtained both at Dessau and Mariendorf is positive proof that heavy loss in the volume and quality of the gases must necessarily follow, and that because of the increased density of the coal caused by dropping it in in bulk—this being responsible for the loss in volume. Dr. Bueb says "that shortly after charging, the pressure in the lower part of the retort amounted to about 4½ inches; but it soon fell to the normal pressure of about 1·2 inches." It is to be regretted that Dr. Bueb omits to give the pressure or vacuum in the ascension-pipe. I have carried out a number of experiments on dumping charges of coal into vertical retorts, with the object of ascertaining the exact conditions in regard to pressure at the top and bottom of the retort. In one instance I had about 75-10ths pressure at the bottom lid, and a slight vacuum in the ascension pipe. In another case quite recently, I got 47-10ths at the bottom, with a level gauge at the top. It will be obvious that, working under such conditions as the former, the bottom half of the retort (at least) is responsible for the loss of volume, the top half is responsible for the loss of illuminating value, and that the loss is not all due to decomposition by coming in contact with highly heated surfaces. As Dr. Bueb states that "the exit passage is a relatively cold core of coal," no possible harm can happen to the gas in its passage through this. But it is difficult to understand that, while the temperature of the "cold core" at the end of the first hour was only 145° C., the temperature of the evolved gases was 190° C., and that it was not until the fourth hour had been reached that the "cold core" within the retort exceeded the temperature of the gases evolved outside the retort altogether—viz., 370° C. "cold core," 318° C. evolved gas. It is none the less difficult to reason that, with a temperature of about 1400° C. playing round the outside of the retort, and the outer rings of the column of coal pressing against the sides of the retort exposed to the same temperature, the transmission of heat—say 8 inches one way, and 5 inches the other—is only able to raise the temperature of the core 250° C. in five hours. I am assuming that, at the end of the fourth hour, the heat would have already penetrated the charge to a depth of 2 inches from the sides; and I am taking the retort as being 20 in. by 14 in. diameter.

Dr. Beub says: "The gas evolved on carbonization will seek the way of least resistance; and so, passing into the middle of the retort, this core serves as an exit passage." I am quite in accord with Dr. Bueb on this point, so far as the putting in of whole charges is concerned. At Exeter, we were successful in taking from the retort a piece of coke about 1 ft. 6 in. in diameter, and 2 ft. 9 in. long, and through the middle of it, there was a hole (as near a circle as possible) 5 inches in diameter. Many gas engineers saw this particular piece of coke, and can bear me out in what I state. When experimenting with whole charges, we usually found the column of coke had a hole through it as described. One can reason from this that the transmission of heat from all points of the circumference towards the centre would tend to maintain a gentle expansion—keeping the coke pressing against the sides of the retort until such time as there was nothing left to expand; then for a sudden contraction to take place, leaving small spider-web-like bridges across one diameter of what was formerly a plastic bubbling mass, giving up its last gases—hastened, in so doing, by the rapid penetration of heat over a very small area.

In carrying out experiments with the single vertical retort at Exeter I had a mortar-mill cleaned, and in it ground a quantity of slack to a very fine powder. I was anxious to see the effect produced when 7 lbs. of this powdered coal was dropped into the retort. The result was about what I expected. The sudden evolution of gas was so great that all the seals were blown out. Under these difficulties, the experiment was proceeded with, in order to ascertain what would be the result inside the retort. On being opened, it was found to be full of light coke more like feathers than anything else.

It may not be out of place to quote the published statements of some of the authorities on this question of temperatures:—

Mr. O'Connor states:

> The gas leaving a retort freely has only a temperature of 220° to 330° Fahr., owing to the great absorption of heat on its assuming a gaseous form.

Mr. Charles Hunt states:

> It is certain that the portion of coal actually undergoing decomposition cannot be at a very high temperature, as the heat absorbed in decomposing the coal and volatilizing the hydrocarbons would prevent the attainment of a very high temperature, of about 752° Fahr.

Mr. Newbigging states:

> That the temperature of the gas, although generated at 2200° Fahr., probably does not exceed 135° Fahr.

He further states:

> The reason of the difference in the effect produced in the two instances is explained by the fact of the rapid absorption of heat by the volatile constituents of the coal in assuming the gaseous form.

Professor Lewes states:

> The temperature of the charge in a heated retort will be found to vary enormously in different parts of the retort. With an initial temperature of 1000° C. (1832° Fahr.), the temperature of distillation will vary from about 800° C. (1472° Fahr.) close to the walls to about 400° C. (750° Fahr.) in the middle of the coal. So also when the gaseous products are distilled off, they are subjected to a temperature of 1000° C. (1832° Fahr.) against the sides of the retort, while above the charge they are probably only heated to 600° C. (1112° Fahr.).

Temperature and Illuminating Power.—In the 1903 setting at Dessau, Dr. Bueb had lateral openings up one side of his retort; and these were used for carrying away the gas as made through a vertical chamber removed from "direct heating." Dr. Bueb stated that "they took the view that the gas must be removed from the retort as quickly as possible after its production, and by the shortest route, in order that the decomposition of the illuminants might be avoided." "The disadvantage was," says Dr. Bueb, "that the retort could only be heated on three sides." The lateral openings were bricked up; and Dr. Bueb chose the plan of giving the gas a "longer route" through a column of dense coal, and a "relatively cold core," and dispensed with his "baking

chamber," which, to use Professor Lewes's apt illustration, was "the finest naphthalene factory in the world."

I quite agree that the centre of the charge (with whole charges) is the easiest passage for the gas that is being generated; and it is fairly certain that little or no gas passes up between the coke and the retort. [The question of keeping the carbonization or the bulk of it on the top, is a matter I will deal with later.] What takes place in a horizontal retort during carbonization has been well described by Professor Lewes, Mr. Charles Hunt, and others; and I will again quote from them.

Mr. HUNT, in "Chemical Technology," Vol. III., says:

> At the commencement of the carbonization of a charge of coal, when the exterior portion of the mass is undergoing decomposition, the hydrocarbons produced not having to pass through or over incandescent coke, escape from the retort with comparatively little change. The illuminating power of the gas is high; and it contains but little of the more highly condensed hydrocarbons. As the carbonization progresses, however, the exterior portion of the mass becomes converted into coke, and its temperature rises, and approximates to that of the retort itself; so that the gases produced in the interior of the mass have to pass through a gradually increasing thickness of incandescent coke. Consequently decomposition of the hydrocarbons becomes more and more complete.

Professor LEWES says:

> The upper layer of evolved gas will be at a temperature of 11,000° C. (1832 Fahr.), and the lower near the coal 600° C. (1112 Fahr.).

I might here mention that, some years ago, when in conversation with the late Mr. Jonas Drake, he told me of a case of a Yorkshire gas manager who made it a rule to have the charges lifted with long bars at the end of the second and fourth hours; and although this process was something which amused his brother gas managers, Mr. Drake declared that the results were better in volume and illuminating value than could be obtained at other works using the same kind of coal.

Professor LEWES also states:

> The ideal carbonization of coal would consist in subjecting every particle to a perfectly uniform temperature, so regulated that the decomposition of the hydrocarbons in the coal would yield hydrocarbon gases of the highest possible illuminating value; since whether or not it is desired to make high-power illuminating gas or high-power calorific gas, the best results can be obtained in this way. Having gasified the hydrocarbons, the next essential is to remove them as rapidly as possible from the zone of heat, in order to prevent any secondary actions which, by decomposition or polymerization, would break them up into less valuable heating or lighting gases. It is at once evident that *uniformity of action* is really the keynote of success in any process of carbonization.

Mr. Butterfield has published figures from investigations in which the candle-power reached 17 to 18 candles, and went as low as 8 candles; averaging 14 candles for the period of time the charge was under distillation. Mr. Blair has also furnished figures where the candle-power for the first hour was 6 candles above the average obtained; the second hour, 1 candle above the average; and the third and fourth hours, 4 candles under the average obtained for the whole four hours.

Illuminating Power and Rapid Removal of the Gas.—Dr. Bueb gives the names of several English coals with which I have had experience both in horizontal and vertical retorts. It is well known that, in ordinary retort-house practice, the illuminating value of the gas from the fifteenth to the forty-fifth minute may be 20 or 21 candles even from a Durham coal; but as time passes, and the decomposition goes on, the last hour produces a gas which, as recently said, "is scarcely worth collecting." Taking three of the English coals which Dr. Bueb mentions, from which he gets 11,400 cubic feet per ton of 13·40-candle gas, I have got the following results:—

Ordinary Working in Horizontal Retorts.

	Tons.	Cubic Feet per Ton.	Coke lbs.	Illum. Power. Candles.
No. 1	46	10,537	1570	14·33
2	73	10,135	1554	14·30
3	27	9,557	1677	14·00

Continuous Carbonization in Vertical Retorts.

	Cubic Feet per Ton.	Illum. Power.	
No. 1	13,358	13·80	No tar,
2	13,192	13·70	
2	13,191	13·38	
3	13,570	13·50	

In experimenting with the above coals with a view of getting high candle powers with smaller charges than usually used, I obtained the following results:—

Carbonizing in Small Charges.

	Candles.
No. 1 average illuminating power maintained for 7 hours	20·44
1 " " " " " 7 "	20·64
2 " " " " " 9½ "	20·45
3 " " " " " 7¾ "	18·89

(Readings taken with Harcourt's pentane lamp.)

Professor Lewes's Test at Exeter.

Camerton coal, 13,250 cubic feet of 14·72-candle gas.
Same coal (ordinary working), 9802 cubic feet of 15-candle gas.

The above affords proof of the value of the vertical retort with continuous feeding, and the removal of the gas from the retort as quickly as possible.

The following table gives the average composition from six tests recorded by Professor Lewes:—

Hydrogen	52·25
Unsaturated hydrocarbons	3·56
Saturated hydrocarbons	34·01
Carbon monoxide	5·63
Nitrogen	3·82
Carbon dioxide	0·43
Oxygen	0·30
	100·00

The following are tests (recorded by Professor Lewes) of the gas from the vertical retort at Exeter:—

	A	B
Hydrogen	32·57	36·63
Unsaturated hydrocarbons	3·06	7 06
Saturated hydrocarbons*	60·05	52·29
Carbon monoxide	4·02	4·02
Nitrogen	—	—
Carbon dioxide	0·30	—
Oxygen	—	—
	100·00	100·00

The influences attending the decomposition of the gases from a charge in horizontal retorts, I venture to say is not augmented to such an extent as is imagined by the deflection of heat through the free space between the charge and the crown of the retort; and, as the result of many experiments, I believe it is only the thin layer of gas immediately in contact with the crown and sides of the retort which attain anything like the temperature of the retort itself. The transmission of heat through a charge of coal in a horizontal retort is not by any means equal; and my observations invariably proved that the upward carbonization equals three-fifths of the distance, and the downward (each assisted by the horizontal penetration) equals two-fifths of the distance.

The conclusion that the gases are impoverished more and more as the carbonization proceeds, is accepted generally. The rate of transmission of heat has been proved to me when collecting some of the inner core of the charge for distillation in another retort. What I mean is this: Finding that the gas coming from the retort at (say) the fourth hour was only of 13-candle value, I have had the retort opened, got to the core of the charge, taken some of it, put it into an already heated retort, and realized 17 and 17½ candle gas from it; whereas the gas from the same coal in the interior of the charge was only giving, "through the ever-increasing jacket of coke," 13 candles in value.

I have many records of the effect of passing different qualities of gas through heated coke, and have proved losses of from 4 to 8 candles by the same operation, which is acknowledged to be going on to-day in the carbonization of coal in horizontal retorts. In the first hour of carbonization, absolute proof is given that the lighting value is there. Then why not adopt any system which, as Professor Lewes says, "will give uniformity of action?"

I might here draw attention to the irregular production of gas in horizontal retorts hour by hour, approximately—

	Hour.	Newbigging. Per Cent.	Herring. Per Cent.	O'Connor. Per Cent.	Blair. Per Cent
Rate of Production.	1st	52	33·4	52·0	43
	2nd	34	29·5	34·5	33
	3rd	12	26 7	12·0	20
	4th	2	10·4	1·5	4

With continuous feeding, the rate of production of gas in the vertical retort is almost constant, only varying from about 18·6 per cent. to 13·4 per cent. between the first and sixth hour, except when it is desired to run a charge off for testing purposes, and obtaining the weights of the various products.

Tar and Liquor.—I have not at command just now sufficient data for dealing with the results obtained at Dessau and Mariendorf in regard to the tar and liquor obtained. The amount of tar at Dessau is from 5·6 to 5·8 per cent. of the weight of the coal carbonized, and at Mariendorf 4·21 per cent. The experience at Exeter was the production of from 4 to 5 gallons of tar per ton of coal carbonized; and Mr. Norton H. Humphrys in his report states: "The tar is certainly reduced to 4 or 5 gallons per ton; and, with further experience in working this process, there is no reason why it should not fall to a mere nominal amount."

In the tests up to the time when the writer designed an apparatus for returning the tar to the retort, the amount was 5·2 gallons per ton. For four months following the introduction of the apparatus, the tar-box remained practically at the same level, as shown by the tests already published.

The average quantity of liquor obtained (by condensation only) varied from 10·75 to 15·36 gallons of coal carbonized. I am not inclined to place any importance of financial value on the small extra production of ammonia, but would rather devote attention to obtaining an increased quantity of gas. The immense possibilities of obtaining large volumes of gas per ton are at present hidden away in the perfect carbonization of coal, "auto-carburation," and the combined production of water gas in vertical gas-retorts.

In the "JOURNAL" for June 7, 1904 (p. 656), will be found an account of my experiments in making water-gas in the vertical retort. Since the time mentioned in my letter, I have carried out numerous experiments in this direction. In combination with the carbonization of coal in a vertical retort, I have made

* See report of Irish Association meeting, "JOURNAL" for Aug. 23, 1904.

as high as 28 per cent. of water gas; and if my memory serves me right (I cannot get at my note-books at the moment), I carried the volume to close upon 17,000 cubic feet per ton. I am almost sure the exact figure was 16,425 cubic feet. With a judicious use of steam, properly applied, and applied at the right time, there is no difficulty in getting a combination of the three systems.

The bane of the vertical retort with full charges dumped in, is the heavy back-pressure at the bottom of the retort, and the danger of dragging down the illuminating power by the excess of vacuum in the ascension-pipe necessary to overcome the excessive pressure at the bottom of the retort. This difficulty also has now been overcome in a very simple way. Many attempts are at present being made to arrive at perfect conditions in the carbonization of coal; and if anything like the increased volumes already obtained can be maintained (of which personally I have no shadow of doubt), then one can imagine the great national blessing it would confer by the extended life of the coal-age of Great Britain.

Notes on Ascension-Pipe Temperatures.—The subject of temperatures has such a large part in the general question, that perhaps it will not be out of place to include here a few notes on ascension-pipe temperatures.

Mr. NEWBIGGING states:

> Permanent gas at its highest temperature does not probably exceed 135° Fahr., though generated in a heat usually reaching 2200° Fahr. . . . The higher temperatures, I am of opinion, were due to the presence of steam in the gas in varying proportions; and this latter would be caused by the moisture in the coal.

Herr KÖRTING says:

> It may be added that the ascension-pipes were always kept perfectly free, and such a thing as auguring and pipe-jumping, may be regarded as done away with.

I particularly mention this here, as later it will be found to have an important bearing on the temperature of the gas as evolved from the Dessau retorts, and also with a series of temperatures given in connection with the vertical retorts at Exeter.

In the table given by Mr. Newbigging the temperature of the gas 3 feet from the mouthpiece averaged 187° Fahr. during the first hour of the distillation of the charge; and he states that "through all the higher temperatures down to 172°, steam was condensed." This undoubtedly proves that the first hour may be termed the "moist stage" of carbonization; and whatever follows can only be termed the "dry-stage" of manufacture. It is during the period of the greatest production of gas and the highest temperatures due to the presence of steam from the moisture of the coal, that choked ascension-pipes are unknown. Mr. Newbigging also gives a series of ascension-pipe temperatures varying from 177° Fahr. at the end of twelve minutes to 110° Fahr. at the end of three-and-a-half hours.

The late Mr. William Foulis placed on record the following temperatures taken at different points in the ascension-pipe:—

1 ft. 6 in. from Mouthpiece.	12 ft. from Mouthpiece.	22 ft. from Mouthpiece.
890° to 518° Fahr.	444° to 167° Fahr.	246° to 144° Fahr.

The temperature of the evolved gases as supplied by Dr. Bueb are approximately as follows:—

	Degrees Fahr.
1 hour after charging	374
2 hours ,,	590
3 ,, ,,	599
4 ,, ,,	504
5 ,, ,,	422
6 ,, ,,	419
7 ,, ,,	415
8 ,, ,,	410
9 ,, ,,	401
10 ,, ,,	338

It will be noticed that the temperature rises from the commencement to the end of the third hour, at which time it may be assumed that the whole of the moisture had been driven off; and the "moist stage" of distillation had reached its highest point. It will also be observed that the temperature of the core of coal at the end of the second hour was only 392° Fahr. But at the end of the third hour the temperature had risen to 536 Fahr., and from that time continued to rise to the end of the ninth hour to 1148° Fahr. Yet the temperature of the gases evolved from the third hour to the tenth hour actually dropped from 599° Fahr. to 338° Fahr.—conclusively proving that, after the third hour, there was an absence of steam temperature acting on the thermometer. The seven hours' "dry-stage" of manufacture, with rapid increasing temperature of the charge, probably accounts for "the extraction of pitch from the collecting main"—one of the sights witnessed by the eighty or ninety engineers invited to see the plant at Dessau.* It would appear from the temperatures given, that the highest rate of production ran counter with the highest temperature in the second, third, and fourth hour.

The average temperature of the evolved gas, taken 6 feet from the mouthpiece, when working the single vertical retort at Exeter was, for a period of seven hours, 265° Fahr.; the highest temperature reached being between the fourth and fifth hours, when 328° Fahr. was recorded. Ten feet from the outlet of the hydraulic main, the average was 132° Fahr.; the highest result being 138°. Another test over a period of six hours gave an average of 326° Fahr. at 6 feet from the mouthpiece. With the continuous feeding of small charges, I have always found that, when the charge of coal has reached the middle of the retort, the temperature of the gas in the ascension-pipe (6 feet from the mouthpiece) has averaged about 336° Fahr., and varies very little until the last hour, when, in the case of stopping the feeding and burning off the charge, it drops to 280° Fahr. in the last hour, and finishes at about 230° Fahr. in the last half hour. The temperature taken 10 feet from the hydraulic main, compared with the above, maintains an average of about 132° Fahr., with a difference of only 30° between the highest and the lowest temperature recorded for the whole six hours.

In vertical retort practice, with continuous feeding, I think it may be accepted that the great regularity of the temperature of the gases evolved is due to several causes, the chief of which it is impossible to obtain when the whole charge is dumped into the retort, as practised at Dessau and Mariendorf—

(1) There is the constant dropping into the retort of a quantity of coal containing a percentage of moisture; thus maintaining, as already described, the "moist stage" of gas manufacture and a steady action of steam heat on the thermometer.

(2) A regular flow of gas, which is bound to accompany the continuous system of charging; an absolute absence of choked ascension-pipes; carbonization kept at the uppermost point; and the gases set at liberty with practically no chance of decomposition of the hydrocarbons; and a natural provision made for all underneath lean gases to pass through a strata in which richer gases are being generated.

* See "JOURNAL" for Oct. 31, 1905, p. 19.

Outstanding Loans of Local Authorities.

There was issued last week a return, ordered by the House of Commons last session, on the motion of Mr. Gibson Bowles, showing the total amount of the outstanding balances of the loans of local authorities in England and Wales, Scotland, and Ireland, at the close of the financial years 1873-4, 1883-4, 1893-4, and 1903-4 respectively, with the totals for the three countries on these dates. The figures for the first-named period, are, unfortunately, incomplete, as no particulars were available for Scotland. For England and Wales, however, they were £84,194,956; and for Ireland, £3,074,845. The following are the figures for the three later periods:—

—	1883-4.	1893-4.	1903-4.
England and Wales	£164,879,947	£224,158,370	£393,908,138
Scotland	21,884,092	36,889,622	59,314,968
Ireland	6,231,834	9,027,014	16,008,311
Grand total for the United Kingdom	£192,995,873	£270,075,006	£469,231,417

In the twenty years covered, the outstanding loans have increased as follows: England and Wales, £229,028,191; Scotland, £37,430,876; Ireland, £9,776,477—total for the United Kingdom, £276,235,544.

State-Aided Usurpation of the Work of Professional Men.

The retiring President of the Institute of Chemistry (Mr. David Howard) was addressing the members at their annual meeting on the 3rd inst., and made some remarks upon a subject to which we have given some prominence lately, and in which professional chemists and others have a very real grievance. In the course of his observations, he stated that it was with reluctance that the Council had to take up an attitude which might seem in any way antagonistic to the National Physical Laboratory; but they had been obliged to direct the attention of the Executive Committee to the fact that their test pamphlet indicated that they might undertake work which they were forbidden to undertake under the Treasury report on which the laboratory was founded. The Executive Committee had recently given their assurance of their desire to avoid any cause for complaint. He was sure that the Council would be glad to see the laboratory placed on such a sound footing financially that its authorities would have no temptation to extend the work of the laboratory beyond its proper sphere. The President also said he thought the profession had reached a somewhat critical stage in its history. With greater facilities for training, and consequently a larger supply of chemists, it was evident that only the most efficient could hope to be successful. He believed that the demand for chemists was increasing; but authorities and manufacturers were learning that they must have efficiency. He further referred to the fact that agricultural colleges were now undertaking tests—of soils for instance—at 2s. 6d., which was also injurious to the profession.

Professor Lewes on Fire, Fire Risks, and Fire Extinction.—At the Society of Arts last night, Professor Vivian B. Lewes, F.I.C., F.C.S., gave the first of a series of four Cantor Lectures on the above subject. He dealt with the science of fire, ignition, the results of combustion, and the causes of fire and their classification. Next Monday he takes up the subject of fire risks.

SOUTHERN DISTRICT GAS ASSOCIATION.

The Annual Meeting of the Association was held last Thursday in London, at the Hotel Cecil. The occasion, as will be seen, was an exceptionally interesting one; and there was a large attendance of members. The new PRESIDENT (Mr. F. W. Cross, of Lea Bridge) was in the chair.

INDISPOSITION OF THE RETIRING PRESIDENT, AND A VOTE OF THANKS.

The PRESIDENT said he wished to express his personal regret, and he was sure that of the members, that the retiring President (Mr. S. Carpenter, of Dorking) was unable to be present. He was suffering from a severe cold. The members would all be sorry to be deprived of the pleasure of the presence of Mr. Carpenter on this occasion.

The minutes of the last meeting having been taken as read and confirmed,

The PRESIDENT said it would be fitting perhaps at this stage—seeing that he was in the chair, which would have been occupied by Mr. Carpenter until the time came for him to induct the new President—if he proposed a vote of thanks to the retiring President for the services he had rendered during the past year. He had much pleasure in making the proposition.

Mr. S. W. DURKIN (Southampton) seconded the proposition. Having gone through the mill himself, he could appreciate a President's feelings on receiving the thanks of the members on such an occasion.

The motion was very heartily passed.

REPORT OF THE COMMITTEE.

The report submitted by the Committee reviewed the work of the past year; among the paragraphs being the following:—

At the autumn meeting, which was held at the Hotel Cecil—the President in the chair—the chief item in connection with the election of office-bearers for the ensuing year was the retirement of Mr. James W. Helps, the Honorary Secretary and Treasurer, after eighteen years' service, and the appointment of Mr. A. F. Browne as his successor. The capabilities of both these gentlemen, and the important part taken by the late Secretary in connection with the prosperity of the Association are so well known to the members that they need not be enlarged upon. The Association has been fortunate in regard to its Secretaries. Mr. Chapman held office for twelve years; Mr. Helps for six years longer. In Mr. Browne these gentlemen have a successor who will worthily maintain the dignity and duties of the office.

The Committee desire to state that the investigations of the Naphthalene Sub-Committee have been greatly facilitated by the sympathetic action of the Directors and Engineers of the Gaslight and Coke Company, who, as reported at the autumn meeting, have placed the condensing plant at the Silvertown Works at their disposal, where Dr. Colman has been engaged upon research work for some months. The results are interesting and valuable, and in many respects consistent with what might be expected. Some discrepancies have, however, been recorded, which are believed to be chiefly due to differences in the coal carbonized. In view of the rapidly-diminishing balance of the special fund subscribed for the purpose of this inquiry, it has been decided to suspend operations until the summer—the season at which the vagaries of the naphthalene difficulty are often most apparent—when it is hoped that further experiments, on one or two descriptions of coal only, may be arranged and carried out. Upon their completion, it is proposed to prepare a full report upon the whole scope and results of the inquiry, and to present the same at the autumn meeting.

Four names have been added to the roll of membership, and five members have resigned; leaving a total of 170, as compared with 171 at the end of 1904.

The balance standing to the credit of the Association at the commencement of the year was £105 18s. 6d. The receipts have amounted to £86 2s., and the expenditure to £86 1s. 3d.; leaving a sum of £105 19s. 3d. to carry forward. The usual copies of the "Reports of the Gas Associations" were presented to the members; and this absorbed a sum of £42 10s.

In concluding, the Committee feel that the best thanks of the members are due to the President and Hon. Secretary for their valuable services to the Association during the past year.

Mr. R. BEYNON (Torquay) said he had much pleasure in proposing the adoption of the Committee's report. He did not think it necessary that it should be read, as it was an extensive one, and he had no doubt the members had all perused it.

Mr. F. F. FARRAND (Ryde) seconded the motion, which was unanimously carried.

The PRESIDENT remarked that they had to thank Mr. Norton H. Humphrys for drawing up the report in the final form, which they all appreciated.

ELECTION OF NEW MEMBERS.

The HON. SECRETARY (Mr. A. F. Browne, Vauxhall) moved that the following gentlemen be elected members of the Association: Mr. J. F. Braidwood, of West Greenwich; Mr. C. F. Franks, of Bankside; Mr. T. S. F. Gibson, of the Old Kent Road; Mr. W. D. Hunter, of Rotherhithe; Mr. A. M. Duckham, of Bournemouth; and Mr. Bernard F. Browne, of the Primitiva Gas Company, Buenos Ayres. It will be observed that all but two of these gentlemen are associated with the South Metropolitan Gas Company; and the two exceptions—Mr. Duckham and Mr. Bernard Browne—were formerly on the Company's engineering staff.

Mr. J. TYSOE (East Greenwich) had pleasure in seconding the motion. The names of the gentlemen proposed were well known to most of the members; and he himself had the honour of personal acquaintance with them all.

The motion was adopted.

PRESENTATION TO MR. J. W. HELPS, On His Retirement from the Secretaryship.

This brought the proceedings to the point to which the members had looked forward with the keenest interest and pleasure.

The PRESIDENT, rising amid cheers, said: I now rise to carry out what is perhaps the most interesting, if not the most important, item of the programme. This is the presentation to our friend Mr. James W. Helps of a tangible testimonial—I say tangible, for it is large and valuable—of the esteem in which we hold his services to the Association during the past eighteen years. Generally the two persons who are more or less embarrassed on such occasions as this are the one who makes the presentation in finding fitting words to express the feelings of the members, and the recipient of the testimonial. Still I will try to do my best. Gentlemen, you have known Mr. Helps for many years. Personally, I met him for the first time in 1880 at the gas-works at Weston-super-Mare. Unfortunately perhaps for myself, that acquaintance dropped for a time; and it was only when I joined this Association in 1896 that I renewed the acquaintance. That acquaintance I trust will continue for many years to come. During eighteen years Mr. Helps has carried on the duties of Honorary Secretary of the Association with the greatest ardour and the greatest success; and the number of members has grown and the Association has benefited during his reign in office. For eighteen years, his organizing powers have been used to our advantage. He has been the mainspring of the Association, regulating its periods year by year, arranging the meetings, obtaining new members, and procuring papers for the technical discussions. I think he is unsurpassable in the arrangements he makes, too, for our social gatherings. We are all sorry to lose his services. During those eighteen years, this success has not been attained without a vast expenditure of time and energy on his part; and in accepting those services, and that time and energy, we have reason to think that we have deprived him of a great many periods of leisure, which could no doubt have been employed with much greater pleasure to himself, and probably with much greater profit. Perhaps Mr. Helps will say that the work of the Association has been of the greatest pleasure to him. We cannot, however, but be alive to the fact that, in taking that time and energy from him, we have been depriving him of that which could have been expended by him more profitably and pleasurably. Personally, I feel deep regret that the time Mr. Helps has resigned has coincided with the time of the acceptance of office by me. But these changes must come; and we hope to have a worthy successor in Mr. Browne. It would be quite superfluous, perhaps invidious, on my part, to attempt to enumerate all the virtues and qualities possessed by Mr. Helps. If he has been the friend of one, he has been the friend of all; and his one aim has been the success of the Association. We are met together to-day to show, by this tangible appreciation, the esteem and regard in which we hold his services over the past eighteen years; and therefore, before the presentation, I should like to ask two or three gentlemen to make a few remarks, because there are some present who have known Mr. Helps longer than I have done.

Mr. S. W. DURKIN (Southampton): It is with great pleasure that I respond to your call. I had some interest in Croydon very many years ago; I think it was about 1852. The gas-works were then situated in Overton's Yard; and they were the most wretched gas-works that ever man had the management of. I was there for a time; and then I went back home to Southampton, where I have been ever since. I mention this to show to what an extent Croydon has developed since those days; and, notwithstanding, our friend (Mr. Helps), with all the responsibility of his office as Engineer of that large suburban works has given so much time to the interests of this Association. I feel we are greatly indebted to him, and anything we can do—any action of our own—that will cause him to look back for many years to come upon the pleasure of his official connection with the Association, and recall to his mind the hearty thanks with which we acknowledge his services, will not exceed what he deserves.

Mr. CHARLES CARPENTER (London): I take it the objects of an Association such as this are twofold—First, to promote the technical welfare of the industry with which we are connected; and, secondly, to bring the members of the Association into a closer bond of friendship and affection for one another. Taking them in the order in which I have mentioned them—not necessarily because I think it is the proper one in which to take them—I think the high position which the Southern Association has held, and holds, among the Associations of Great Britain, has been largely due to the technical excellence of Mr. Helps's knowledge, and the able manner in which, with that knowledge, he has drawn forth from others technical information which has been of the greatest

possible use to the Association and to the gas industry at large. Secondly, I would say that I can think of no man—I know of no man—who has been better qualified by kind Nature to draw the hearts of men to him in love and affection than our past Secretary. I am sure that I am speaking for you as I am speaking for myself. Many friendships have been commenced and made in the Southern District Association because—largely, almost wholly—of Mr. Helps's kindly disposition. When I say this, I think I have said the two best things that can be said of a man occupying the position that Mr. Helps has done in the Southern District Association. I have, Sir, great pleasure in joining with your remarks and Mr. Durkin's in expressing the high regard, love, and affection that I and the other members of the Association feel for our late kind Hon. Secretary.

Mr. C. S. Ellery (Bath): Until I came into this room, I had no idea that I should be called upon to speak; but although I could have refused on some subjects, when Mr. Helps was the subject, I felt it would be impossible not to comply with the President's request. I have known Mr. Helps now so long that it is not only as a professional brother but as a very old friend indeed that I can speak. It is always a pleasure to see Mr. Helps—whether in London, Croydon, or in one's own town. He is always the same. I cannot say that of all men. He is always ready to be friendly, and ready to be helpful. We owe him a debt of gratitude as men; as members of the Southern Association we owe him a deeper debt of gratitude than we can ever repay; and the gas industry itself owes to Mr. Helps more than we can really understand. How he has got through his work year after year, I cannot conceive; but I believe his health has suffered. For this reason I am glad he has resigned the secretaryship. We want such men to live long. He stands here, to me, to-day a man whom the younger members of the Association may gladly emulate. If he has done nothing else in his career than to encourage others to put forward their best energies in all ways, he has done much. I have had the greatest pleasure in coming here to see Mr. Helps again, and to see the son of an old friend of mine in the chair.

Mr. T. N. Ritson (Ramsgate): As a north countryman coming south, I wish to express to Mr. Helps my thanks for the great hospitality he has always accorded me when I have attended these meetings. It has been the greatest pleasure to me as a north countryman, to make Mr. Helps's acquaintance. He has rendered valuable services to the gas industry and to this Association; and I am pleased the members decided to show their appreciation of his hard work in the tangible manner they have done. I can only hope, and I am sure every member in this room to-day will hope, that Mr. Helps will be spared for many years to enjoy this beautiful gift, and to be with us at our many reunions in the future. Mr. Helps, I wish you long life and good health.

Mr. A. F. Browne (Vauxhall), also called upon by the President, said: In the recent circular issued by the Committee, they made the statement that they were of opinion that, to Mr. Helps's influence, the present position of this Association is largely due. Now we have come to the very last day, and even the final function, of Mr. Helps's Honorary Secretaryship. It has been very long, very able, and very successful. Against his own better judgment, I am sure, he has yielded for some years back, year by year, under pressure from ourselves, and has consented to go on for a short time longer. But the time has now come when he feels it right to retire; and it would be not only very ungrateful, but inconsiderate on our part if we were to longer prevent his leaving us. The Association may congratulate themselves, I think, that Mr. Helps is retiring in such an excellent state of health as he appears to be to-day. We have the satisfaction of knowing that we have not worked him up to the last pound. There is a reasonable and lively hope that he will be spared to the industry and the Southern District Association for many years to come; and I hope that we shall have the benefit during that time of his ripe wisdom on our Committee. I am sure I may promise him in the name of the Association that a life governorship is at his disposal as long as he is willing to occupy it. As we look back upon the past years, we may ask ourselves, What is the secret of Mr. Helps's great success, which has earned him a popularity never greater than to-day? Of course, we know what abilities he has as an Engineer, as a man of affairs, and as an organizer. It is something deeper than that, and it has been gracefully alluded to by one or two speakers. It lies in his social gifts, in his personal charm, and in his high character. He has been the devoted servant of this Association; he has been, as the President himself happily pointed out, the friend of each member; he has been the most courteous, the most approachable of officials. If there is one word that will sum him up, it is the word "human." He is one of the most human of the men with whom I have come into contact. Now to-day, we ask his acceptance of this tea and coffee service. It has not cost a great sum of money; but I think that it is worth his acceptance, and we—the members—on our part, need not be ashamed of it as an offering to him on this account. And of this we may be quite sure, that it will possess in Mr. Helps's estimation, an intrinsic value far beyond its mere money cost. As years roll on, and as from time to time, on festive and other occasions, his eye wanders to that service, he will experience a thrill of pleasure as he thinks of the old days and of the meetings, as well as a feeling of legitimate pride that he was able for eighteen years to command the respect, the esteem, and the affection of members of the Southern Association. Then, I say, the object which we have in presenting this gift to him to-day will be fully carried out—fully reached.

The President: I am sure you will commend me for having got such words as we have heard presented to us in such manner as I could not possibly have given voice to. Mr. Helps, on behalf of the members of this Association, it gives me the greatest pleasure to present to you this token of the members' esteem, regard, and affection. The inscription upon the kettle is—

Presented to James W. Helps, M.Inst.C.E.
by the Members of the Southern District Association of Gas Engineers and Managers,
upon his Retirement from the Honorary Secretaryship after Eighteen Years' Service.
8th March, 1906.

Mr. Helps, as I have said, it is with the greatest pleasure that I present this gift to you on behalf of the members; and I trust you may possess it for many years to come, and then hand it down to your children, and they to their children. Health, peace, and happiness we all wish you for the remaining period of your life. I am sure as long as you have strength and health, you will come and give us the benefit of your services. You will give it not in an official capacity—but of your own voluntary act, because you are always ready to give—yea, even more than you receive. I congratulate you upon your return to health; and I trust, on behalf of the members, you will continue in health and strength for many years to come. I have the greatest pleasure in presenting you with this handsome testimonial.

[The gift was a silver tea and coffee service of beautiful design, enclosed in a chest. The kettle bore the above inscription, and the other pieces, Mr. Helps's monogram.]

Mr. Helps (who was received with loud cheers) said: Mr. President and Gentlemen, I am sure there is no one here this afternoon who can better appreciate the opening remarks of Mr. Cross than I do. He spoke of the two people, who on such occasions as this, felt the greatest amount of embarrassment. He has dealt with the embarrassment that he himself felt as the presenter of the gift; I can only speak as to the embarrassment I feel as the recipient. I stand before you this afternoon a very proud man. I am also the possessor of very mingled feelings and emotions. Naturally, the feeling most prominent in my mind is one of deep gratitude to all of you—not only to those who have spoken the more than kind words—for the kindness you have shown me in taking part in this presentation. I cannot say, as some people say on such occaions as this, "I never was more surprised in my life," because the Secretary and the President some few weeks ago wrote and informed me of the intentions of the members, and asked me to meet them, and give them my views as to the form that the presentation should take. Ever since then, I have felt very much indeed the kindness of the members. At the same time, I have had certain feelings of regret, and for two reasons: First of all, because I hardly felt that services such as those I have had the pleasure of rendering to the Association should be rewarded in the tangible form that is the case to-day. And, secondly, I could not forget that it was only some thirteen years ago that the Association kindly presented me with a very handsome gold watch, which has been my constant companion ever since. I felt the members had, in making that presentation, rewarded me not only for the years past but for the years to come. But as a matter of fact, that gift appears to have been looked upon as a sort of interim dividend; and to-day comes the final settlement on the parting of the ways. It is with the greatest feelings of regret that I abandon the position of Honorary Secretary of the Association. After eighteen years' service, one cannot help feeling certain pangs on giving up the associations for which the Honorary Secretaryship has been responsible. But, on the other hand, I felt I was compelled to relinquish it for more reasons than one. In the first place, I wanted to do so because I thought it wise to slacken off some of the work I had been doing; and, secondly, I had found the position such a pleasant one that I felt it was not fair of me to occupy it any longer. I therefore wanted to give someone else a chance. I am sure that, when Mr. Browne has held the position only half or a quarter as long as I have, he will be of the same opinion, that the Honorary Secretaryship of such an Association as this is a position anyone may envy. I feel that the position this afternoon ought to be reversed; and, instead of my standing here to thank you for your kindness and your generosity to me, I ought to be possessed with the feeling of embarrassment owned to by your President, and that I should be presenting you, if not individually, yet collectively with a testimonial, because I feel the Southern District Association has been to me more than I can ever express. When, 22 years ago, I left (if I may so call them) the wilds of Somersetshire and came to live near London, I knew nothing of the ways of the gas engineers in this district; and I was not at all sure what reception I should get. There were, it is true, a few with whom I was acquainted; and among them I am pleased to remember were the names of Sir (then Mr.) George Livesey and Mr. Corbet Woodall, whose kindness I can never forget. I also renewed my

acquaintance with Mr. Chapman, who was then the Secretary of the Association. In the course of time he proposed me as a member of the Association, and from that day to this—from the day I was elected—I have never wanted friendship, for I have been able to reckon all of you as my friends. Whatever success or prosperity has been mine since I came to London, I attribute in no small degree to the kindness and the friendship shown to me by the members of the Association, both individually and collectively. The services I have rendered have not been, and ought not to be rendered, in the expectation of any reward but that which comes from the pleasure of service. I like to feel that the title "Honorary Secretary" is not a misnomer, and that the work is, and has been, done without any idea of reward. It is a work that can be rendered ungrudgingly when you have it at heart. It has been my endeavour so to work; and what you have told me to-day proves that I have been at any rate to a certain extent successful. It would, however, ill become me to say that I do not appreciate the handsome testimonial you have given me. It will always be looked upon with the feeling expressed by one of the members to-day, for it will bring back happy memories and happy times, and will call to mind the many faces I have learned to love during my occupancy of the position. And my family when they look upon your handsome present will be reminded that their father was a man who was not at any rate unloved; and they will remember this when the voice of him who is now speaking will be silent, if not forgotten. Gentlemen, once more I thank you with all my heart.

[Mr. Helps resumed his seat amid applause.]

The Hon. Secretary said that Sir George Livesey was unfortunately unable to be present, and Mr. Corbet Woodall was likewise absolutely prevented from coming. Mr. Woodall deeply regretted his absence, and said in his letter: "I have known Mr. Helps from the very commencement of his career; and my respect and I may say my affection for him has increased with the increase of the years of our friendship. I could only give up an engagement which I have in Hull on Thursday at the expense of considerable inconvenience to other people." He had also a letter from Mr. Charles Wood, the President of the Institution, regretting that he was unavoidably prevented being at the meeting. During the after-dinner proceedings, a letter was also read from the ex-President of the Institution (Mr. D. Irving), in the course of which he referred to Mr. Helps as "the life and main spring of our Society," and attributed the success of the Association largely to his organizing genius.

The President then delivered the following

INAUGURAL ADDRESS.

That the Southern District Association of Gas Engineers and Managers should have considered me worthy to fill the office of President—an office held in the past by many worthy men and leaders of our profession—gave me, I need hardly say, great pleasure, as well as much pride. These feelings, however, were somewhat alloyed by the fact that, in due course, I should be called upon to present to you a more or less lengthy address, as well as by a certain want of confidence in my ability to do justice to your selection. How easily it comes to us to talk what may be designated as "shop" when we meet one another in a casual way, and how quickly the time seems to slip by while we touch upon a large variety of subjects of more or less interest to us individually. On such occasions, the cues to the various topics arise so naturally—one thing leading to another—that there is no cessation to the flow of conversation. To-day, as your elected President, I have to present to you some personal thoughts that may be likened to a one-sided conversation; but I trust that, when these thoughts are expressed, they may prove of interest to you, and be deemed worthy, if only in a small way, of your consideration.

Individually, we are all of us units of one large body of professional men, united collectively by the various District Associations, and also by the Parent Association, the Institution of Gas Engineers; for it must be remembered that, although affiliation with this Parent Association occurred only within the past year or so, and that it is claimed by some that the children are older than the parent, yet the origin of the latter, as the British Association of Gas Managers, dates back to the year 1863. Since then, the Association has changed its name, and to some slight extent its constitution; nevertheless, it is still the old Association, and even now numbers among its members some of those who joined it in its earliest years. At that period of our history, unity of action seemed far from attainments; yet year by year we approached nearer to that ideal, until to-day we are a united body, prepared, under the banner of commercial enterprise and progress, to face the criticism and to meet the commercial enterprise of our rivals; and, by unity in thought, word, and action, to carry that banner on to victory.

It may be suggested that this unity is to some extent hampered by the fact that in our daily work, in our own separate districts, frequently somewhat widely apart, we are individually each fighting our own battles, each meeting our own innumerable difficulties as they crop up from day to day, without any apparent cohesion or uniformity of action with our fellow workers. When, however, we remember that for many years past we have been able to unite at meetings of the Parent Association, or of the District Associations, to listen to addresses on all matters descriptive either of the engineering or the management branch of our profession, also that of late years there has been a development of the gatherings of units of more or less informal character, and, further, that we are most admirably served by our friends of the Technical Press, it will, I think, be readily seen that these isolated units are capable of being united into an army sufficiently great in strength and energy to carry on the good work of our forefathers.

Digressing for a moment, may I say that mention of the word forefathers suggests to me the fact that at all our gatherings we meet and see around us many sons of worthy fathers carrying on the same work of gas engineering and management? I venture to think, if appealed to directly, those sons who have already arrived at mature age and have assumed similar responsibilities, would unanimously support me in the assertion that most of the knowledge they possess they owe directly or indirectly to the example and foresight of their fathers in their profession; and many, I am sure, could relate from their recollections of the past, numerous instances of the great assistance given them, and of examples of perseverance set them, by their fathers, which have advanced them in the profession even beyond the knowledge of those fathers. May the sons of to-day prove to be worthy of their inheritance, and join in forming a brotherhood much stronger in unity than has been possible in the past.

Further, to assist in this unity, there has now arisen the comparatively new-born affiliation of the District Associations with the Parent Institution—the Institution of Gas Engineers; and from this much is to be expected in the future. Up to the present time, affiliation has presented itself to the general body of members as an unknown quantity. I would therefore suggest that, as this idea emanated from the Institution of Gas Engineers, the Council of that body should endeavour to lay down some general and broad principles as to what affiliation really means, and the objects and advantages that will be attained by such affiliation. The Council should then embody the same in a short memorandum to be passed on to the various District Associations for free and open discussion by the members. I feel assured that, if this were done, the result of these discussions, after separating the wheat from the chaff, would be to strengthen the Council of the Institution in coming to a conclusion as to the best lines upon which the central body and the district branches could render one another mutual help for the betterment of the profession at large.

For many years past, the question of research work has engaged the attention of various Presidents of this and kindred Associations. But, unfortunately, the results have been small; and what has been achieved has been due rather to individual than to collective effort. It will, of course, at once occur to the minds of the members of this Association that a year or two ago a Sub-Committee of this Association was appointed with the object of research into that recrudescent question, Naphthalene, its Origin, and its Cure; and we all know that valuable work has been done by that Committee. About twelve months ago, however, the Committee found that, solely from lack of funds wherewith to carry on the investigation, their labours would probably be barren of much ultimate result; and it was suggested that this Association having become affiliated with the Institution of Gas Engineers, the latter body should come to the assistance of the Association in order that the results of so much labour should not be thrown away. Much discussion ensued upon this suggestion, with a somewhat negative result. On one side, it was contended that the Institution had no funds wherewith to help this Association to continue the investigation; and, on the other side, a fear was expressed that, if the Institution took up the subject, it would make it its own, and so deprive our Association of the credit justly due to it; for it was the Southern District Association who initiated this investigation, that bristles with so many difficulties, and has now carried it to a point from which it is apparent that some definite result might reasonably be expected. In my opinion, to look at this matter from either of these points of view is altogether too narrow, and not worthy of a body desirous of being united for the common good of the industry we all have so much at heart.

Is it not a well-known fact that many engineers have upon their staff young men of special intelligence, who show special aptitude for special subjects? Those engineers are wise who, of their riper experience and by their advice and counsel, foster and develop this special aptitude, not only to the benefit of the company or corporation they represent, but to the ultimate advantage of the whole of the industry. In like manner, I would suggest that the relationship existing between the Central Institution and the Affiliated Associations should be more or less of the same character as exists between the engineer and the intelligent member of his staff who shows this aptitude for specializing in any direction. The Central Institution should show an anticipatory interest in the doings of the District Associations. If any one of these Associations should initiate the investigation of any particular subject, and this subject should appeal to the Council of the central body as one in which further investigation would be for the benefit of the industry generally, then the investigation should be delegated to the District Association, and with some measure of authority. If it should be necessary that certain funds should be found, then the appeal for such funds should come from the Central Institution. Such an appeal would be more authoritative

and would cover a wider area than could be possible to any District Association. At a later period, the result of this research work on any special subject should be embodied in a paper, and read before the members of the Central Institution and discussed by them.

I do not profess to put forward anything new or novel in this suggestion, but give it simply as one of my thoughts, and with a view to direct the attention of others to the question of how affiliation may become a real union—something more than a name which sounds well perhaps, but which, at the present moment, does not appear to have any concrete meaning. In his paper read to the Eastern Counties Association in April last year, Mr. Shadbolt, of Grantham, made some valuable suggestions tending towards the commercial unity of members of the profession in certain defined districts; and I was greatly impressed with the value of those suggestions, as I had myself for some time been seriously considering how this commercial unity could be applied to what may be termed the London District. This, I think, is another subject that might well engage the attention of the Council of the Institution with a view to development.

It will be apparent to all that in our District Associations there is what one may term an irresponsible freedom of thought and expression, which cannot possibly exist in a meeting of the members of the Central Institution. This is due, no doubt, to the more intimate, companionable, and personal relationship existing between the individual members of these Associations, and also to the more or less kindred relationship in the methods employed in carrying on the commercial side of their several undertakings. The Central Institution, consisting of members gathered together from all parts of the United Kingdom, meets but once a year; and the result of these meetings is undoubtedly of great benefit to the industry generally. On the other hand, the District Associations meet two, three, or four times a year; and the frequent and more or less informal nature of these meetings allows of a closer personal acquaintance and intercourse of the individual members one with another, and of the discussion of topics of personal experience in a manner which is not really possible in the more formal meetings and the discussions of the Parent Institution.

"Whatever happens to one happens to another." But this remark applies more to the small things of this life and our daily work than to the larger; for I venture to express the opinion that the strength of the present-day engineer or manager, and his value to his company or the profession generally, depend not only on his value as a constructing engineer capable of designing and carrying out large and important works, but on his powers of organization, his business capacity, and his adaptability in dealing with the numberless small, but none the less important, matters that make up the daily life of the average gas manager. It is to a great extent in the informal discussion one with another of these small items of our daily experiences and business methods that we obtain knowledge, and thereby gain confidence, for the carrying on of our individual work. In nearly all towns and districts the gas manager has now to face the competition of electric light; and this competition is so keen, and at times so palpably unfair—particularly when the electric lighting is in the hands of the municipal authority—that a little reflection will convince every one of us of the great responsibility attached to the manager or secretary, who has the duty placed upon him of developing the sale of gas in face of this competition.

This leads me to the further thought, prompted by my own experience, that our customers are ever ready to utilize this competition to the utmost advantage to themselves, and are always ready to compare one gas company and its methods with another. I am sure those managers who share what may be termed the London and Suburban district could, from their experience, recall many instances where the comparison so made is particularly odious, and at times difficult of explanation. The customer is not to be blamed for looking at the matter from his own point of view, nor for endeavouring to obtain every advantage from his conviction, probably ill-advised or unsound, that what is done by one company in a certain district should be done equally well, and as cheaply, by others in an adjacent district. We all know there are many circumstances which govern these differences, yet it is well-nigh impossible to impart the knowledge of these circumstances to individual customers.

I have found, however, that the statements made by these critical customers are sometimes wholly at variance with the facts, or contain just a sufficient modicum of truth to enable them to argue their point with apparent reason—at least from their own point of view. When it is a question only of the difference in the price of gas, or of the price of coke, one is equal to the task of answering the arguments or criticism of the customer by the special circumstances governing each case; for every manager must perforce have considered for himself the difference in the price of gas or residuals between his own and neighbouring companies. But it is quite different when we come to consider the varying commercial methods of those neighbours; for it is surprising how very much we are in the dark as to the business or commercial methods of even the nearest of neighbouring companies. One of the more recent branches of our commercial enterprise is that of slot installations. Yet even in this, where one would be led to expect the greatest uniformity, we find the greatest diversity of method, dependent no doubt upon what each manager would call his peculiar circumstances. This is a conventional expression; but more often than not the manager himself makes the circumstances peculiar merely to suit his own peculiar thought and ideas of the matter under consideration.

Contemplating this diversity of business method, I communicated last year with all the secretaries and engineers in and around London, with the object of obtaining expressions of opinion as to the desirability for some unification and uniformity of the commercial side of our business. The response to this communication was favourable; and later on a meeting was called to discuss the question. My idea was to inaugurate what is called a Commercial Section for London and the surrounding districts, upon somewhat broader lines than the Commercial Sections of the Manchester or the Eastern Counties districts; for, as you are aware, these sections were formed primarily to deal with the question of residuals, and I hoped the London Commercial Section would go farther than this, and endeavour, by a system of intercommunication and co-operation, to arrive at a unification of the commercial methods adopted by the various companies.

It may be said—in fact, it was said—that I was aiming at an ideal which it would be very difficult to achieve, and if my desire had been for absolute uniformity in our methods, it would have been doomed to failure from its inception. The meeting referred to was attended by a representative gathering of the secretaries and engineers of companies in and around London, and a perfectly unanimous opinion was expressed as to the desirability of intercommunication and co-operation in regard to methods of management—more particularly in the matter of distribution; but a difficulty arose as to its inauguration. It was not to be expected that a scheme to carry this into effect could be framed and adopted in a moment; for while not so controversial as the "Fiscal Policy," the question is one which is not without its difficulties, and which requires careful consideration, and full and deliberate discussion in all its details in order that its adoption may produce the greatest advantages. I feel that this need for consideration and discussion is ample justification for including this subject in my address to you.

The multiplication of Societies or sections of Societies, is to be deprecated, so I suggested the broad lines of a scheme whereby co-operative intercommunication could be carried out; and from the fact that each of those joining in the scheme would ultimately become more or less intimate with the methods adopted by others, I felt that, in course of time, such co-operation would no doubt tend to the unification of our commercial methods of management. [Permit me to repeat that by management I refer more particularly to that portion of our business which has now become so highly important—viz., the distribution and the development of the sale of gas.] The nature of this scheme would be somewhat informal, and would depend for its success upon one or two conditions. As a preliminary, it would necessitate the formation of a small Committee, with one of their number to act as Honorary Secretary. The details of how best to work this scheme could be arranged and laid before a meeting of all those interested in this question of co-operation; and I would suggest, as a matter for your consideration, whether this scheme should not form part of the work of the Association. The second condition would be, that all those who agreed to join this co-operative scheme should be imbued with a feeling of complete unselfishness—that they might freely impart to others such knowledge as they themselves possess, and such details of their methods of working as they have thought wise to adopt.

Here, perhaps, is the ideal most difficult of attainment. Yet why? Surely there is nothing in the nature of a trade secret about the process of gas manufacture, nor in the matter of distribution; and rivalry or competition between two gas-lighting authorities in the same district is now quite unknown. Why, therefore, should there be any element of secrecy about the commercial methods adopted in the development of our business? Competition is the experience more or less of all of us; and there is no doubt that we shall be subject to still greater competition in the future. But such competition can act only as an incentive to the development of our commercial instincts. If, therefore, by uniformity of method, we can help one another to meet this competition, it is the bounden duty of all of us to sink selfishness, and do our level-best towards this end.

It cannot be denied that the commercial instinct is more developed in some than in others; and quite naturally so. We are not all born with the same gifts; while some have greater opportunity than others for the development of their commercial instincts by the circumstances of their position. Still, I do not think it can be said of the general run of gas managers that they are not alive to the necessity of such a development; and to those who possess this gift, or the opportunities, I would urge the practice of the virtue of unselfishness, which will help in spreading a knowledge of the best commercial methods among their professional brethren, so that in course of time the industry at large would be advantaged and more fitted to cope successfully with competition present and to come. Personally, I have lately had some experience in meeting competition; and in the hope that this experience may be interesting, and perhaps in some small degree useful, I would practice what I preach, and relate some of the steps I have taken to meet this competition.

A decade has elapsed since I took up my present appointment with the Lea Bridge District Gas Company, who, as you are aware, supply a growing district of Greater London. During this period, the population of the Company's district has increased

from about 60,000 in 1895 to about 130,000 in 1905; the output of gas, from 87 million cubic feet to 258 millions, or nearly 200 per cent.; the number of ordinary consumers, from 1350 to 4469; the number of ordinary cookers, from 200 to 1615; while the number of slot consumers with cookers is now 3644—the fixing of slot meters having been started in 1901. The length of mains during the ten years has increased from 38 to 85 miles. I mention these figures in order to give you an illustration of the growth of the Company's business, and to show you that during this period of ten years there has been much to do in the development both of manufacturing plant and of distribution. I do not, however, intend to bore you with the details of this development, for more or less the same has occurred to all of you. So I will pass on to the period which saw the beginning of active competition with the electric light.

In 1897, one small portion of our district was invaded by the electric light of the Leyton District Council; but the effect of this was small, and might be likened to the tickling of a fly on a rather thick hide. In 1901, the Walthamstow District Council started their Electric-Light Works; and while the new light was being exploited for all it was worth, we had naturally to acknowledge a set-back to our progress. This was a decided pin-prick; and it stimulated us to extra exertion that we might maintain our position. It is pleasing to record that, during the whole of the period from the installation of the electric light up to the present time, our lowest average increase for any single half year was 4 per cent., in 1902; while for the past half the average increase of output was 13 per cent. It is perhaps as well to mention that a portion of this apparent set-back was without doubt due to the extraordinary development of the incandescent gas light which occurred about that period.

This state of things, to a greater or lesser extent, will, I think, have been the general experience; and during the period of saturation of a district by the electric light, the gas company interested in the district would have marked time. Later on, however, its march of progress would be resumed; and the company would ultimately rise superior to all competition. Now this position of superiority is not to be gained by taking the fight sitting down, and waiting for the business to come; neither is it to be gained by setting your back to the wall and trying simply to defend yourself from the attack of the competitor, and just keeping what you have already got. You must advance, and push into the fray, with a full appreciation of the fighting power of your competitor—backed, in most cases, by the municipal coffer.

The measure of progress of the two lights—electric and gas—is summed up in the fact that during the last few years the only practical improvement in the former has been the so-called flare lamp (for large and open spaces) and the Nernst lamp. These are, however, subject to certain disadvantages. The arc lamp and the glow lamp have only been improved to a very slight extent. On the other hand, I have only to recall to your minds the Gas Exhibition at Earl's Court in November-December, 1904, with its magnificent display, to show the developments and improvements made in gas lighting. No one believes that improvement has reached finality with either of these lights; and while gas lighting is still in the front, it is our duty to endeavour to keep it there. It is requisite, however, that the knowledge of this superiority be brought home to the consumer and the public. This is only to be done by a system of education in the true value of the two lights; and though at times it may be a tedious operation, yet "Never say die" must be our watchword, and with dogged perseverance and insistence this higher education must be given, and will be attended with the most beneficial results.

The first operation of a municipal electric lighting body is to get a good advertisement, by lighting the main streets and the municipal offices and other buildings utterly regardless of cost. This has to be met by a counter-advertisement on the part of the gas company; and for effecting this I know of nothing better than a good show-room in the centre of the district, where gas lighting of all descriptions, kept thoroughly up to date, may be seen at its best. Not the least desideratum in connection with the show-room is an attendant, courteous and pleasing in manner, and with an abundance of tact. This show-room should at all times be in telephonic communication with the works or offices—if by a private line, so much the better—for customers call at the show-room with all sorts of complaints and inquiries. To be informed that the matter shall be reported to the works is, in many cases, received as a most unsatisfactory answer; and many opportunities of doing business are lost unless the inquiry can be dealt with promptly. It will, I think, be obvious to all that a show-room attendant should at all times be able to get into direct communication with the chief or his assistant; and I may say I have on many occasions, while sitting in my office, spoken to a customer at the show-room, and have been able to settle points that could not in any way have been so satisfactorily settled by correspondence.

While the English have been facetiously, and perhaps justly, called a nation of shopkeepers, it is not every gas manager who receives a special training of this nature. Nevertheless, it will be found to be quite worth his while to study the methods adopted by the most successful shopkeepers for the pushing of his trade and business. Among the foremost of these methods is that of advertisement of all descriptions—large placards posted throughout the district, a large and regular advertisement in the local paper, and a liberal distribution of small bills containing what I may term catchy information of sufficient interest to excite the curiosity and attract the attention of the reader—reflection, and the customer, come later. In the second place, the needs of the district should be studied; and the articles required to meet these needs should be liberally displayed in the windows and inside the show-room. Last, but not least, customers like to know what will be the full cost of an article; and I have found it advisable to mark in plain figures on all goods displayed for sale or hire exactly what the customer will have to pay. It is well to avoid, if possible, any misunderstanding or mistake on the part of the customer in this respect. If, for example, we are displaying a certain pendant, we price that article complete with burner and shades. This remark should apply to all goods on show.

If a lady customer enters a draper's shop to purchase a yard of ribbon, she is treated with distinct deference and courtesy with a view to her further custom. In like manner, if a customer should enter a gas company's show-room for a free burner or a boiling ring, he should be treated with the same courtesy as if he were giving a large order for fittings, or for the largest cooker in the establishment. A friend is thus made who may, at a later date, come back with an order for that cooker. A pleased or satisfied customer is the best of all advertisements for a gas company.

We all know that the term "monopolist," as applied to the gas company, has now become proverbial; and it is difficult to convince customers that we do not act as such. By courtesy and tact we can, however, to a great extent, remove the impression; and it should be the object of the manager to insist upon this courtesy being exercised by all the members of his staff—yes! and throughout the whole body of workmen, who, in any shape or form, come into touch with the company's customers. You will pardon me if I appear to labour this point; but having had to develop the business of a company in a district where the majority of the residents were at one time distinctly antagonistic to the gas company, I have learnt to believe, and have endeavoured to put into practice, that "manner is of more importance than matter."

In concluding this address, I thank you for the kindly and considerate hearing you have given me. If I have dwelt rather fully on the more personal side, it has been, as I premised, only because the relation of my experiences follows out the thoughts of the forepart of my address and might perhaps be useful to others. We have now fully turned over a fresh page in the history of gas lighting, and appreciate that, while the improvement of methods of manufacture, and the cheapening of the cost of production are as important as ever, a still more important duty faces us—the development of the commercial methods for the sale of our product of manufacture. I would therefore again urge the necessity for union and unity not only in our Associations, both parent and affiliated, but among ourselves—mutual unselfishness, mutual counsels, mutual assistance, with but one end in view—viz., the successful maintenance of our profession in spite of all opposition and competition.

Mr. J. T. Jolliffe (Ipswich) moved a vote of thanks to the President for his excellent and instructive address. He thought the Association were very lucky in having gentlemen so skilled and able to come forward year after year to deliver such interesting addresses; and the least they could do was to offer them their best thanks.

Mr. C. F. Ruggles (Leighton Buzzard) seconded the motion, which was very cordially carried.

The President thanked the members for their kind reception and acknowledgment.

Representation on the Council of the Institution.

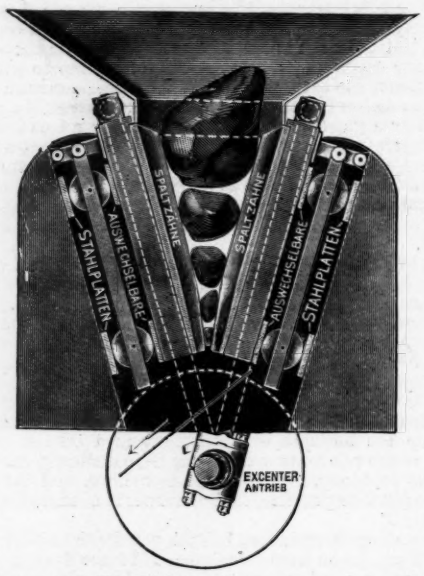
The Hon. Secretary said he thought it would give the members great satisfaction to learn that, at a recent meeting of the Committee, the President was nominated as the district member of the Council of the Institution of Gas Engineers for the current year.

In the evening, the members dined together; Mr. John Miles, J.P., the Chairman of the Lea Bridge Gas Company (also a Director of the Gaslight and Coke Company and of three other Gas Companies), honouring the members by his presence. After dinner, songs and speeches made the pleasure of the members complete.

Gas-Engine Plant for Cement Manufacture.—It appears that the seven 400 brake-horse-power Oechelhaeuser gas-engines which have been ordered by the Associated Portland Cement Manufacturers, Limited, is not, as was stated recently, the first application in this important industry of gas-driving on a large scale. Mr. P. W. Robson, representing the National Gas-Engine Company, Limited, says that it is fully four years since they successfully applied gas power to one of the most important cement works in the country; and since then they have executed other important contracts of the same kind. At the present time they have in hand engines aggregating 3000 brake-horse-power for various cement manufacturers in England. One order alone includes five engines, of which four are of 350 brake-horse-power each. The latter are for rotary kiln driving, where absolute reliability for continuous working over several weeks without stoppage is a *sine quâ non*.

EITLE'S COAL-CRUSHER.

A description was published in a recent number of the "Journal für Gasbeleuchtung" of an apparatus for breaking coal, invented by the firm of C. Eitle, of Stuttgart. The essential features of the crusher are shown in the accompanying vertical section.

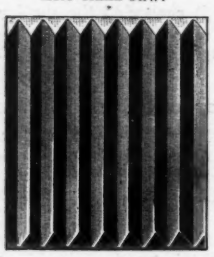


["Excenter Antrieb" is "Eccentric Driven." "Auswechselbare Stahlplaten" are "Renewable Steel Plates." "Spaltzahne" are "Steel Jaws."]

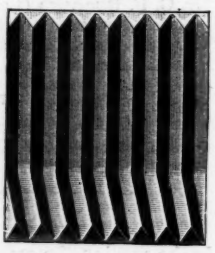
Section of Eitle's Coal Crusher.

The supports of the jaws which crack the coal are disposed convergently; so as to leave the usual conical hopper between them. At their lower extremities, where their major axes cross, they terminate in bearings for a common driving pin. This pin is arranged eccentrically on a driving wheel, to which motion is given in any desired fashion. As the wheel revolves, the pin rises and falls, carrying the jaw supports with it. As the jaws rise, the space between them widens, and coal enters; as they fall, they approach one another, and the coal within the hopper is cracked. In order to reduce internal friction as much as possible, the motion and thrust of the jaw supports is taken by the rollers shown in the diagram, which move upon replaceable steel plates.

Left-Hand Jaw.



Right-Hand Jaw.



The construction of the jaws themselves is indicated by the two smaller illustrations. The left-hand jaw is provided with straight vertical teeth, which oppose, point to point, the corresponding teeth in the upper part of the right-hand jaw. At the lower part of the latter, however, the rows of teeth are bent aside from their straight direction, and so at the bottom they lie midway between the teeth of the left-hand jaw. When the jaws begin to fall from their highest position, the coal in the upper part of the hopper is crushed between the converging teeth, and tends to be splintered—it is said, mainly in one direction. When it falls to the lowest part of the hopper, where the teeth are not directly opposite one another, the splinters are cracked across; so that finally the particles delivered from the apparatus are all of approximately one size, are free from dust, and are in the best condition for carbonization.

The crusher will treat coal of any kind—even Scotch cannel or Australian boghead, as well as ordinary gas coal. It is made in various sizes, ranging in hourly capacity from 5 to 50 tons; and energy equal to 6-horse power is sufficient to break 30 tons of English anthracite per hour. The crusher has been at work without interruption in numerous places for several years, and is stated to have given complete satisfaction to its users. It is protected by two patents in Germany—Nos. 84,039 and 134,871.

DISTRIBUTION OF GAS AT A DISTANCE.

The current number of "Le Gaz" contains an article by the Technical Editor (M. Paul Parsy) on the above subject, in the course of which he gives the following particulars of two instances of high-pressure gas distribution in France.

The communes of Triel, Verneuil, and Vernouillet form together a settlement of some 4000 or 5000 inhabitants, situated about 4½ miles from the gas-works at Andresy (Fin d'Oise) belonging to M. Mallet. In order to obviate the laying of a main which would have been too large at the outset, and possibly too small when the consumption of gas had increased, it was decided to supply the places named under high pressure. Accordingly, a wrought-iron main 3 inches in diameter was laid in a thick bed of bitumen, to prevent rust. It was divided into sections by means of valves, so placed that any leakage could be easily localized. The sections were rather more than half-a-mile in length. The pumping is done at the works by an ordinary pressure pump, the only peculiar feature of which is the absence of piston-rings; the piston being merely furnished with grooves in which the lubricating oil lodges, and thus ensures tightness. The pressure required to deliver about 1000 cubic feet of gas per hour is 14·5 inches; about 1600 cubic feet, 17 inches; and about 2100 cubic feet, 36 inches. The maximum pressure contemplated will not exceed 60 inches. The gas is aspirated directly into a meter which measures the output; and irregularity of pressure is guarded against by the interposition of an anti-fluctuator. The pump is actuated by a 6-horse power gas-engine, which drives all the other machinery in the works. At the end of the main, at Triel, there is a storage holder of about 10,000 cubic feet capacity, the outlet-pipe of which is connected with the town mains. When the holder is full, the further supply of gas is cut off automatically, and warning is given at the works by the ringing of an electric bell. The two places are also in telephonic communication. The installation has been working very satisfactorily for two months; and it is in contemplation to supply the commune of Chanteloup (with some 3300 inhabitants), by a branch about midway between the extremities of the high-pressure main.

A system of distributing gas at a distance by means of suction, carried out by M. Frère, the Manager of the gas-works at St. Quentin, has been in successful operation for rather more than two years between the works at Chantilly and the commune of Gouvieux. The gasholder at the latter place is connected with the works by a main 2½ miles long; one-fourth of which is 8-inch, and the rest 5½-inch. Several consumers are supplied from the former section, and a few from the latter. The initial pressure at the works is 12-10ths; but, owing to the difference in altitude, it is 20-10ths at the point where suction takes place, which is always done during the daytime, when the consumption is lowest. During this period, the pressure falls from 20-10ths to 16-10ths for a normal output of 1750 cubic feet per hour. This difference in pressure decreases with distance, and has never given rise to any complaint. The capacity of the Gouvieux holder is about 12,000 cubic feet; and it gives a pressure of 36-10ths. Pumping is done by a Roots blower, which will give a pressure of about 80 inches.

In conclusion, M. Parsy records a case of an isolated gasholder station erected to ensure the supply of a commune served by a main which had become inadequate. The commune in question was Lespignan (Hérault), about 1¾ miles from the gas-works at Nissan. At the entrance to Lespignan there is a gasholder of about 3500 cubic feet capacity on the main coming from the works, after having passed through and supplied Nissan. This holder fills during the hours when the pressure in the main is greater than that given by its own weight, and it empties itself as soon as the pressure becomes lower—thus ensuring a supply of gas at the time when the main is inadequate. The rise of the holder is stopped automatically, and it works in the open country without any attention.

A concrete conduit, 5 ft. 3 in. diameter and 11,500 feet long, has been built at Cambridge (Mass.), as a part of the new aqueduct of the water-works of the city. Unless obstructed, it can never be filled; and as there are consequently no severe strains upon it, reinforcement has not been employed save in a crossing under some railway tracks. The concrete is 6 inches thick on the bottom, 13 inches at the sides at the spring line of the arch, and 7 inches on top. Steel centres were used. The concrete was formed of 1 part of cement, 2½ parts of sand, and 5 parts of screened gravel; and it cost $7·23 per cubic yard in place, including all charges except lumber (of which but little was used), superintendence, and engineering.

SCOTTISH JUNIOR GAS ASSOCIATION.

Western District.

The Final Meeting for the present session of the Scottish Junior Gas Association—Western District—was held in the Technical College, George Street, Glasgow, on Saturday evening. The PRESIDENT (Mr. J. Bell, of Airdrie) occupied the chair; and there was a good attendance.

Arrangements having been made for a visit to the works of the Summerlee and Mossend Iron and Steel Company, at Coatbridge, on the 24 inst., and for the annual excursion of the Association on Saturday, the 16th of June, the reading of papers, of which there were two, was proceeded with.

MR. JAMES MANN (Glasgow) read a paper on the subject of the

GLASGOW CORPORATION GAS ACCOUNTS.

The author began by sketching the history of the gas supply of Glasgow down to the passing of the undertakings into the hands of the Corporation, and then referred briefly to the system in operation for conducting the business at the various manufacturing stations and workshops.

Coming to the principal accounts, the author said the first item appearing on the credit side of the capital account was the "stock debt;" and the next the "loan debt." In order to extend the existing works, and to erect and equip new ones, the Corporation from time to time obtained borrowing powers from Parliament. These at the date of the last completed balance amounted to £3,200,000, of which £1,800,000 had been used to meet the cost of works. The money was obtained from the Corporation loans fund, which stood in the relation of lender to the department, and had been accordingly credited therewith. From time to time moneys had been appropriated out of the sinking fund and applied to the redemption of both stock and loan debts. To the extent of these redemptions had the debt to outsiders and the loans fund been reduced respectively—the sinking fund becoming the creditor. On the debit side of the account appeared the assets. These were represented by lands and buildings, machinery, and plant, on which the stock and loan debts had been expended. Whenever new work was entered into, the cost found its way to the debit of this account. Capitalization increased the assets; but it also increased the liabilities, because of the money required to be borrowed to defray the cost of extensions. It was of the highest importance to distinguish between expenditure chargeable to capital account and that chargeable to revenue. All moneys received from the sale of gas, residual products, &c., were debited to the cash account; and the several accounts in respect of which it had been received were credited therewith. At the close of the financial year, the gas-rental ledgers and the residual products ledgers were balanced, and the outstanding amounts taken down. These amounts were debited by journal entry to arrear accounts, and credited to the accounts of which they were debts in the general ledger. The gas-rents and the several residual products accounts were closed by debiting them with the balances thereon, and conveying the same to the credit of the revenue account, which now contained and showed at a glance the entire revenues of the undertaking.

The whole expenditure incurred was debited to the several accounts, and the cash account credited. At the close of the financial year, the stocks of coal and other material in hand were credited to the several accounts on behalf of which they were bought, and debited to the stores accounts. The balance was then struck on the several accounts, credited thereto, and carried to the debit of the revenue account. This account then showed on the debit side the expenditure, and on the credit side the revenues. Before the balance could be struck, however, the account required to be charged with certain sums in respect of the wear and tear that the plant had undergone during the year in producing the revenues. This was called depreciation. The capital account was credited, and the revenue account debited, therewith. Immediately this was done, the balance was struck and carried to the profit and loss account. Depreciation of assets meant the writing down of the value of the assets; and it was properly a charge against revenue in respect of the benefit the trading had obtained from the use of the asset. In determining the rate per cent. to be charged against revenue, the principle of restoring to capital the amount that had been consumed during the year in producing the revenues should be aimed at, whatever the effect upon the profit and loss account might be. Where the plant was maintained permanently in a state of the highest efficiency, and the cost of doing so charged direct to the revenue, opinion differed as to the wisdom of burdening the revenue account further. His own view was that, where permanent maintenance was observed, gas-works did not depreciate at all, but, on the contrary, were in a better and more modern condition at the end of any one year than they were at the beginning. Where both permanent maintenance and depreciation were charged to revenue, the effect was, that (1) through the former the asset was always maintained in a state of the highest efficiency; and (2) by the latter the cost of the asset, which was originally provided out of borrowed money, was released, being substituted by its inclusion in the expenditure against revenue. Thus, through the medium of permanent maintenance, the works were at all times in a modern and thoroughly equipped order; and by depreciation the amounts borrowed might be repaid.

Mr. Mann now came to the profit and loss account, and explained that profits were the excess of earnings over the expenses incurred in obtaining them. To the profit and loss account was conveyed the balance on the revenue or trading account. In addition to debiting the account with the interest paid on the capital employed, there were certain statutory obligations which must be observed. These were the rates per cent. upon the various amounts borrowed which Parliament deemed necessary to impose for the liquidation of the capital employed. The following were the amounts authorized, and the percentages required to be set aside annually to provide for redemption:—

In 1869, £1,000,000; 1 per cent., with accumulations.
In 1898, £1,000,000; 1 ,, ,, ,,
In 1901, £1,200,000; 2½ ,, non-accumulative.
In 1905, £1,000,000; 3 ,, ,, ,,

And, in addition, 1½ per cent. upon the sum of £1,000,000—being the capitalized value of the stock debt so far as it was not redeemed at 1901. The author explained that the latter obligation was postponed till 1905; but from this date an additional £15,000 would require to be set aside for the redemption of the stock debt. From the above table it would, he said, be observed that the periods allowed for repayment of the amounts authorized to be borrowed were being curtailed with every new loan authorized, and this notwithstanding permanent maintenance of the asset, and repayment of capital through the medium of depreciation. This obligation to provide for the sinking fund at the higher rates was becoming a very onerous one indeed. The loan authorized in 1901 was obtained to provide for the erection and equipment of the first section of the Provan Gas-Works. From the time the first sod was cut in 1899 till their opening in 1904, a sinking fund at the statutory rate of 2½ per cent. had been raised and set aside, though the works were only in course of construction. This obligation might, he thought, well have been deferred until they were in a position to manufacture.

The author next proceeded to consider the general balance-sheet. He said the ledger was carefully gone over, and all the debtor and creditor balances collected, classified, and placed to the respective sides of the balance-sheet to which each belonged. On the debit side appeared the liabilities—*i.e.*, the amounts due by the department, such as tradesmen's accounts, deposits made by consumers, the amount of the sinking and contingent funds, &c. On the credit side appeared the assets—*i.e.*, the amounts due to the department, such as for gas-rents, coke, ammoniacal liquor, and tar; as well as all stores on hand, such as stocks of coal, lime, &c. The next step was to make an analysis of the year's working, and compare it with that of the corresponding period. Having described the capital and trading accounts, the author came to the stock register, which, he explained, was kept in terms of section 18 of the Corporation's Act of 1869. The stock was personal estate.

In conclusion, the author said it was manifest that an undertaking which had capital expenditure exceeding £2,000,000 and a revenue of more than £800,000 must be possessed of a large amount of assessable property; and it necessarily followed that it paid huge sums for taxes. The works and pipes of the department were situated in four counties and thirteen parishes. The assessable rental of the department was based on profits. The assessor took the gross receipts, deducted from them the working expenses, and from the remainder made further allowances in respect of interest upon floating capital, the amount of which was estimated as being one-half of the working charges, and

Revenue for Year ending May 31, 1903.

Sale of gas			£653,903	3	0	
Residual products			224,221	10	9	
Waste lime			511	3	4	
Stove hire			6,771	0	4	
			£885,406	17	5	
Deduct sums raised for interest and sinking fund in respect of unproductive works			10,916	6	4	
						£874,490 11 1
Working Charges—						
Manufacture of gas			£586,267	19	5	
Distribution of gas			66,141	13	7	
Stove repairs			7,159	17	1	
Occupier's rates and taxes			1,491	1	0	
Office, &c., rents			5,869	16	8	
Management			11,115	14	3	
Law and parliamentary charges			278	10	1	
Retiring allowances			1,128	1	0	
Occupier's income-tax			2,184	0	0	
Depreciation on moveable plant			16,236	3	10	
						697,872 16 11
Net revenue						£176,617 14 2
Allowances—						
5 per cent on £343,318, half of working charges (including allowance for renewal of meters, stoves, &c.), for interest			£17,290	18	0	
5 per cent on £263,517, value of tenant's plant, for interest			13,175	17	0	
						30,466 15 0
Assessable rental						£146,150 19 2

interest upon the value of the tenant's plant—*i.e.*, meters, locomotives, waggons, tools, and other moveable plant; the balance being the *cumulo* valuation, which was allocated among the several rating areas into which the undertaking extended, in proportion to the structural cost of the works in each. The valuation was wholly dependent upon the fortunes of the undertaking, and varied with every change in its condition. Owing to the decline in the market for residuals, and the abnormal price paid for coal, the valuation fell from £86,000 in 1902 to £13,000 in 1903.

He appended an abstract of the Corporation gas accounts for 1902-3, on which the valuation for 1904-5 was founded [See p. 725], and said it would readily convey to the members an idea of the method followed.

Discussion.

The PRESIDENT, in inviting discussion, remarked that Mr. Mann must have taken great pains in getting up his paper, the perusal of which, when printed in their "Proceedings," would benefit the members more than the hearing of it read.

Mr. P. M'DOUGALL (Helensburgh) expressed his regret at entirely disagreeing with Mr. Mann with regard to the depreciation, which he thought it was necessary to provide in a gas-works. The cost of renewals must be charged to the revenue account in one of two ways—either out of the earnings of the year in which the renewals took place, or out of a fund set aside annually from the profits, and allowed to accumulate at compound interest. In this way, a sum might be provided sufficient to meet renewals as and when they fell due. Plant or machinery might be repaired; but repairs would not provide for the imperceptible depreciation, or the lessening value, which went on day by day, and which only ended when the thing depreciated was renewed or restored to its original condition. Let them take, for instance, a gasholder. They might repair it often; but it could not be kept in such a state from year to year that it could be as good as new at the expiration of its term of life. In all cases where a fund had been allowed to accumulate for the purpose of providing for renewals, this fund, and not the revenue account, must be debited with the cost of such renewals; but as owners of gas-works were not, under the Acts of Parliament which regulated their undertakings, authorized to create such a fund, it followed that they must debit the revenue with renewals when these became necessary. This, in some years, might have the effect of reducing the profits below the sum required to pay the maximum or standard dividend; and in that case the reserve fund could be resorted to to make up the deficiency.

Mr. D. VASS (Airdrie) did not think that Mr. Mann had put in everything which should be included; and it might be in the way of increasing rather than diminishing the assessment. The tenant's capital of a company Mr. Mann took at 5 per cent. on one-half of the year's working. The tenant, in addition to this, was granted something more as tenant's profits. Judges had made allowance for this in sums varying from 12½ to 20 per cent., which came off the net revenue before they arrived at the assessable rent. He noticed also that Mr. Mann had included stove hires; whereas in the Falkirk case he thought stove and meter hires were excluded. But perhaps this was balanced by stove repairs. He had with him a statement made up by an assessor in a town a few miles from Glasgow (not Airdrie), in which the gross revenue was taken, and from it there were deducted stove hires, meter hires, and bad debts; bringing out a certain sum as the revenue upon which they were to base their calculations. From this he took the expenditure, less feu-duty, income-tax, owner's rates, directors' fees, and interest on bank account and on deposits. This left what might be termed the gross revenue of the undertaking. Allowance was then made of 5 per cent. for tenant's capital. This was deducted; and from the balance brought out one-fifth was taken off on account of tenant's profit. So that the tenant only paid on four-fifths of what they might call the net revenue. His Company had recently been taken over by the Corporation, and they had a great fight in endeavouring to get a longer period for repayment. Seemingly Parliament had an idea that the death-knell of the gas-works was not far distant, because they would not allow them to spread their payments over a longer period than about thirty years. And even for a portion of their capital outlay—such as the expenses of forming the undertaking—they must pay it all off within the first five years. When they were handicapped with a sinking fund to provide for such a rapid payment of the original price of the undertaking, there was no room for writing off depreciation. In fact, depreciation would be another tax on gas consumers; and he considered it hardly fair to them that they should be called upon both to pay to the sinking fund and to depreciation. The former would in a few years give them the works as a present. The capital charges in Glasgow were something like 25 per cent. of the selling price of the gas; but members would find in some other places, not far away, that the proportion was 33 per cent. This was a matter which should be recollected when making comparisons between towns. One which had only 3d. of capital charges could afford to sell gas cheaper than another where the charge was equal to 9d. He thought the best form of keeping accounts was given in the Gas-Works Clauses Act.

Mr. S. B. LANGLANDS (Glasgow) remarked that one of the interesting points in the paper was the mode of transfer, when a company was bought out by a corporation. This was the system of having annuitants, to which he was entirely antagonistic. If they were buying out a company, they should buy it out altogether, and not keep people up with a gilt-edged security, because they had a guarantee rate of 6d. in the £1, which there was very little likelihood of ever being imposed. Then, on the depreciation question, they received the same treatment. It always seemed to him very unjust to have both a sinking fund and a depreciation account; and he hoped Mr. Mann's efforts to abolish this system would have some success.

Mr. MANN, in reply, said, with respect to Mr. M'Dougall's remarks, he did not know that he could alter his opinion, inasmuch as, if an asset were permanently maintained in a state of the highest efficiency, if any part of it was done for it was thrown out, and the renewal was directly charged to revenue. The result was that, while before they had a machine which was getting near the end of its life, it was renewed altogether, and a new one installed; and he could not very well conceive how they could charge depreciation for it. Then, in addition to this, the sinking fund, which was meant for the redemption of capital outlay, could also be applied to depreciation. Mr. Vass said he got 20 per cent. for tenant's profits; but he (Mr. Mann) was afraid that he would never get it again, because it was only companies who were granted this allowance. Corporations made no profit, and what they were allowed was the cost of the manufacture and distribution of the gas. He agreed with Mr. Vass as to the form of the accounts; and he agreed decidedly with Mr. Langlands that the handing of annuities in payment of debt, instead of paying cash, was not a very good system; and about three years ago the Corporation of Glasgow entered into a scheme for the conversion of the gas annuities, but unfortunately it met with very little success. What the Corporation offered to the annuitants was this: "The value of your stock at the present moment is £285; in order to convert it into a redeemable debt, we will give you immediately £300 of our 3 per cent. redeemable stock." Now, 9 per cent. on £100 was the same return as 3 per cent. on £300. However, the feeling in Glasgow was not favourable to the scheme; and he might say that probably not more than one-fifth of the annuitants adopted it.

Mr. R. W. COWIE (Lockerbie) read a paper on

THE MANAGEMENT OF RETORT-SETTINGS.

After some introductory remarks, the author said it was of the utmost importance to notice that a setting of retorts, however correct it might be theoretically, in practice was frequently found wanting. The area of the waste-gas flues might be such that, while being sufficient to take away the volume of gas to be dealt with, it was so small as to create a factor at work in increasing very largely the consumption of coke. In other words, where they had flues of ample size, the rate of travel of the gases was much slower; there was no keen, sharp pull on the furnace; and the recuperative action of the secondary-air flues was rendered more complete than in the case of flues made too small, where, of necessity, the waste gases were taken more quickly out of the setting, and in great measure upset the continuous production and slow combustion of producer gases. Of late, the patentees of regenerative settings had been employing tubes, either horizontal or vertical, instead of the more usual brick-built flues. The object aimed at was the rapid and complete removal of heat from the waste gases. The tubes gave a greater area of exposed surface; and since they were comparatively thin, the secondary air was more rapidly and efficiently heated, while the waste gases were more completely robbed of their heat. Where tubes were in use, and in comparison with brick-built flues, they had a tendency to crack and show leakage; and, in consequence, extra care must be exercised in starting and letting down these settings. Nevertheless, where such settings had been adopted, they had shown a greater recuperative effect, and he believed had given every satisfaction.

The author went on to say that before it is possible to efficiently work regenerative retort-settings, a thorough knowledge of the principles underlying them is essential; and these he briefly indicated. He then pointed out that as all internal producers are rectangular in shape, and longer than they are broad, and as they are charged with fuel from one end, care must be exercised to have the fuel pushed well back and spread over the bars at a uniform depth, which should not be less than 2 ft. 6 in., so that equal resistance is presented to the primary air through the fuel. If this were not done, the fuel near the charging-door would, he said, be much deeper than that towards the back; and, consequently, the shallow depth of fuel at the back would be burned away very much more quickly than the deeper part. The obvious result of this was that the gases evolved from the shallow part of the producer would be very weak in calorific value—being principally carbon dioxide. In the construction of producers, depth of fuel should be the object in view, inasmuch as with an excess of carbonaceous material for the primary air to act upon, a regular and constant flow of gas into the setting was the result. With a producer of minimum depth, necessitating more frequent replenishing of fuel, it was undoubtedly the case that at certain intervals the primary air entering was in excess, while the secondary air was likewise in too great volume—both effects having for their result the cooling of the setting. Also with a too shallow producer, local heating and results entirely negative to the principles of gaseous firing were the consequence. In respect of the depth of fuel in producers, the farther they got away from the old type of furnace, used with open firing and a thin layer of fuel, the more economical were the results.

Another point in the working of the producer was the judicious use of steam; and Mr. Cowie emphasized the necessity for care being taken to ensure that the proper amount was given. This could best be ascertained by practice, having regard to the quality of the coke used. Should an excess of steam be supplied, the heats in the setting would suffer, owing to the steam cooling the producer; and when the temperature fell below 1800° Fahr., carbon dioxide and hydrogen were generated—the former doing no good in the combustion chamber, and the latter, on burning, forming water, which passed off with the waste gases as steam, carrying away with it a large amount of heat. Moreover, too much steam caused the zone of heat to be shifted to a point higher up in the furnace, with the danger of clinker forming there, and not allowing the false bars to be inserted for clinkering. The use of steam, therefore, must be carefully manipulated; and practice was the best guide as to the amount. In starting a bed of retorts, before any fire was lit, the flues, ports, and nostrils should be thoroughly cleaned and examined, as pieces of brick might have fallen or have been left in the flues, which would cause obstruction. When these had been found correct, the dampers and slides should be closed; only the top plug bricks in the front of the setting being open, and also the clinkering-door. A small fire should then be placed on the bars, and kept burning—thus drying the producer and nostrils.

Mr. Cowie concluded by saying that retort-settings, like other things, were apt at times to work badly—the heats becoming low and irregular, and causing bad carbonization and therefore loss. The fuel might be at fault. It might be either too small, causing excessive resistance to the primary air; or there might be too much ash in the coke. The remedy for this was obvious—namely, to use better coke. The nostril holes supplying the secondary air sometimes became choked with dust or pieces of brick or coke; and these obstructions might be removed by a bent iron rod. Another cause might be that the producer gases were not being burned for want of secondary air. If this were so, and the slide was in its proper position, some short-circuiting might be taking place in the recuperator; and this could be pointed up with fire-clay. The waste-gas flues were sometimes choked with dust; thus obstructing the passage of the waste gases, and decreasing the draught, causing bad heats. This also happened with the main flues; and the only remedy was to thoroughly clean them. The presence of moisture underneath the retort-bench was sometimes the cause of bad heats; and this could only be rectified by a system of drainage. While a minimum depth of seal in the hydraulic main was necessary, it had been found of considerable advantage to flush out the main with clean ammoniacal liquor at stated intervals, for the purpose of getting rid of tars that might form pitch. Incidentally, it also filled the hydraulic main with fresh liquor, which had a greater absorbent capacity for carbon dioxide and sulphuretted hydrogen, and took the place of liquor which had been supersaturated with these gases. It was also an advantage to have fixed on one or two of the ascension-pipes a test-cock, for the purpose of ascertaining exactly the pressure on the retorts during carbonization.

Discussion.

The PRESIDENT said he thought the members would agree with him that Mr. Cowie had so dealt with his subject as to leave little room for discussion. He hoped, however, that it would elicit some remarks; and it would enhance the discussion if members would mention some of the difficulties they had experienced with retort-settings, and how they dealt with them.

Mr. P. M'DOUGALL (Helensburgh) said it would have added greatly to the value of the paper if Mr. Cowie had included his own practical experience with some particular setting. There were so many different types of regenerative settings in use—in fact, a great many gas managers had a special design of their own—that it would be a difficult matter for any engineer to decide which particular arrangement gave the best results. However, no matter what setting was adopted, the aim was to get the necessary amount of heat from a minimum quantity of fuel. In designing a producer, he thought the most important points to be kept in view were, first, to have adequate grate space, and to allow sufficient depth of fuel, so that the maximum of carbonic oxide should be produced. The author of the paper, Mr. Cowie, had mentioned 2 ft. 6 in. as being sufficient depth of fuel; but in his (Mr. M'Dougall's) opinion, 3 ft. 6 in. ought to be the minimum allowed. It was also of the greatest importance that the charging-door, for feeding with hot coke, should be so placed that it allowed of the fuel being uniformly distributed. It was necessary to make sure that the door fitted against the frame, so as to leave no ingress for air. If air were allowed to enter there, partial combustion would take place in the producer, and this caused local heat below the arch, which would certainly shorten its life. It would also have been of great interest had Mr. Cowie given his opinion as to the class of brick he would employ in the different parts of a setting. He might let them know what kind of brick he considered best for constructing the sides of a producer, the front arch, and the combustion chamber. Mr. Cowie might also, with advantage, have introduced into his paper the subject of the use of pyrometers. By the use of one of these instruments the temperature best suited for carbonizing any particular class of coal could be arrived at, as well as the heat of the setting, &c. To his knowledge, pyrometers were not made use of in gas-works to the extent they ought to be. In his opinion, they were essential for the successful and scientific working of retort-settings; but he hoped the time was coming when they would be universally employed in general retort-house practice.

Mr. J. MACLEOD (Provan) said he thought most gas managers were keenly alive to the fact that the retort-house was the heart of the concern—in fact, there was just a danger that they might spend too much time on this part of the works, to the neglect of other departments. One noticed, with very much of astonishment, that in the new types of gas-producing plant, the main attention was devoted to carbonizing, and less consideration was paid to the way the gas was dealt with after it was produced. They would see tiny scrubbers and small boxes filled with sawdust; and then they had complaints about gas-engines choking up. The gas manager was not in much danger of neglecting his retort-house; but he might be better employed if he devoted more time to other parts of his works. Mr. Cowie had taken up all the important points in retort-house practice. Near the end of his paper he said it was a desirable thing to flush out the hydraulic main with ammoniacal liquor. He (Mr. Macleod) was afraid there would be some difficulty in this; but Mr. Cowie might refer to it in his reply.

Mr. D. VASS (Airdrie) remarked that Mr. Cowie had touched upon a little point on which he had a very unhappy experience—namely, in the selection of a site for a regenerative setting. It was impossible to drain away all the surface water. When the concrete was laid, the water always came up to within about 3 inches of the surface, so that the water level was almost up to the brick level. With a regenerative setting on such a surface, they might be sure there would be much difficulty in working it. They first of all tried to do so by sinking a well, 8 feet deep, in the centre of the yard; but it did not bring the water away sufficiently. Then they sank another, within 18 inches of the front of the bench, also about 8 feet deep—in fact, until they got among running sand. When the pump was started in this well, the water came away so hot that the men could not wash their hands in it. It was sometimes difficult to make up their minds whether they should continue pumping or stop it, because pumping away the hot water just let cold water come in, and this reduced the heat. It was a safe thing, in selecting a site for regenerative plant, to avoid every place where there was a difficulty in draining.

Mr. L. HISLOP (Uddingston) differed from Mr. Cowie when he said that a thorough knowledge of the principles of regenerative retort-settings was essential. He did not consider it was necessary that a good foreman should know all the chemistry of producer gases. If he had certain rules laid down for his guidance, as to watching the waste gases, or the small quantity of flame in the waste gases, he could get quite as good results as if he were versed in some of the appliances which were to be had for determining them. About ten years ago, he had about as much trouble as it was possible to have with pitched mains. They had put down a new bench of retorts, in which they had pretty good heats; but, owing to the men not clearing the pipes properly, they had pitched hydraulic mains about every second day. On two occasions, the supply of gas was in danger of running short. They cleaned out the pipes, and by putting on new men who were better able to charge the retorts, they overcame the difficulty. The flushing of the hydraulic main would be certainly a very great advantage, although he was a little doubtful about what Mr. Cowie said as to the washing of it out with fresh liquor. The temperature of the main was, as near as possible, boiling-point; and he did not think that very much carbonic acid or sulphuretted hydrogen would have remained in the liquor. He thought that at 150° Fahr., or rather less, there would be but little of these left in the liquor. He found now that, by having an extended ascension-pipe, giving it a long fall back into the retort, they could work without choked pipes, even with unequal charges; and if they had a good take-off valve, of which there were plenty on the market, he thought this would get over any difficulty quite as well as if the main were regularly flushed out. In his opinion, it was highly necessary to have a good depth of fuel. In the producers he used, they never had less than 6 feet, and sometimes 8 feet, as a minimum depth of fuel. This always ensured a good supply of hot coke and a full production of heating gas.

Mr. MACLEOD said there was one point brought up by Mr. Hislop to which he would like to refer, and that was the fitting up, in small works, of a simple form of gas-analyzing apparatus. He quite agreed with Mr. Hislop that a skilled man, giving his attention to what was going on in the retort-house, would get as good heats, whether he used or did not use such apparatus. But what about the amount of trouble involved? The trouble necessary to learn the use of a simple apparatus was not great, and the satisfaction of the man knowing that he was burning his fuel economically was quite sufficient to justify the purchase. He would strongly advise everyone to put in a simple form of apparatus, and to use it in his retort-house.

Mr. J. DEWAR (Glasgow) put a question as to the point of admission for steam.

Mr. COWIE, in reply, said that in many cases, where it was expedient to put down a shallow regenerative setting, there was not much more room than 2 ft. 6 in. for the depth of fuel; and this depth he had made the minimum for such a setting. The class of brick to be used was not mentioned in the paper; but ordinary fire-bricks, such as were supplied by various firms, did very well for a complete erection, except for the producer walls and the

arches of the producer. These would require a silica brick, which stood a much higher heat than the usual fire-clay brick. In his opinion, the eye, in ascertaining the colour of the retort, was quite as good as any pyrometer. Of course, the cleaning, purifying, and scrubbing of the gas should not be neglected. Mr. Hislop's remarks as to the flushing of the hydraulic main with liquor, to clear it from tar and to prevent pitching, were just what he would have said in reply to Mr. Macleod.

The PRESIDENT briefly proposed a vote of thanks to the readers of the papers; and it was heartily accorded.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Visit to Vauxhall.

On Saturday afternoon, undeterred by the depressing state of the weather, upwards of thirty members of the Association assembled to inspect the Vauxhall station of the South Metropolitan Gas Company; and it is safe to say that at the conclusion of the visit all the members of the party were glad that they had not allowed the rain, or other considerations, to keep them away. The Engineer (Mr. A. F. Browne) and his staff (of whom particular mention may be made of Messrs. D. Chandler and C. J. D. Gair) seem to take a real delight in showing interested persons all that is to be seen on the works. It is only a few months ago that the Association of Engineers-in-Charge spent a very pleasant afternoon at Vauxhall; and on that occasion, as we well remember, Mr. Browne and the other officers were just as indefatigable as they were on Saturday in pointing out and explaining the different things to be seen. When chronicling this earlier visit, we gave some particulars (see "JOURNAL" for Oct. 17, 1905, p. 177) of the plant both at the Vauxhall works and at the neighbouring gasholder station at Kennington Oval; and it is therefore unnecessary to repeat them here. Suffice it to say that nothing was missed, and that the visitors were able to see in the different retort-houses charging and drawing being done by Arrol-Foulis hydraulic machinery, by West's compressed air system, and by hand. In one of the retort-houses, the members were very greatly interested in the working of a hydraulic pipe-augering machine, which was doing its duty in a quiet, unobtrusive, but at the same time very effectual, manner. This machine—which was designed by Messrs. G. C. Trewby and A. Biggart, and was manufactured by Sir William Arrol and Co.—is for the purpose of cleaning the ascension-pipes. It is provided with a knuckle-jointed, and therefore flexible, shaft 3 inches in diameter, carrying the auger-head, which is driven up the pipe by a hydraulic ram, and is at the same time rotated. The retort-houses came last in the inspection of the works; for, on considerations of convenience, the tour was commenced at the purifiers. In connection with this stage in the process of gas manufacture, Mr. Browne explained his arrangement for "boosting oxide." This method consists in placing the foul oxide in brick bins, having false bottoms of ordinary wood grids, and driving air through it by means of a high-speed fan. The oxide is in this manner revivified in a few hours; and thus the plan has proved very useful at Vauxhall, where floor space is limited.

Opportunity having been afforded for a welcome wash, the visitors found an excellent tea awaiting them; and when this had been partaken of, Mr. Walter Grafton, the President of the Association, proposed, and Mr. Dean seconded, a hearty vote of thanks to Mr. Browne, Mr. Chandler, and Mr. Gair for their great kindness. In reply, Mr. Browne said that he had felt it was a privilege to conduct the members round the works. He had great respect for their President, as an old friend and as an expert in lighting, and also as one who had done a great deal for the education of gas engineers. He (Mr. Browne) sometimes got a little nervous when thinking of the rising engineer, for it seemed to him to be a case in which the tail was going to wag the dog. It appeared that the work of the Junior Associations was going to compare very favourably with that of the Senior Associations, and that the latter would have to look to their laurels. There were, as his hearers well knew, many things in connection with the life of a gas engineer which required careful attention, tried a man's nerve, and made him show what was in him; and there was always a great field in gas-works, and in the problems of gas supply, for progress and discovery. The young man of the present day approached these problems with a better basis of education than many of the engineers of the olden time. He felt quite sure that the future of gas was in good hands.

The party then proceeded to the gasholder station, after a brief inspection of which they separated.

The Midland Junior Gas Engineering Association have, by permission of the Principal, arranged to visit next Saturday the New University, Birmingham. They will be met by Mr. R. C. Porter, the Lecturer on Engineering.

The Yorkshire Junior Gas Association will meet at the Municipal Technical College, Bradford, next Saturday, for the purpose of discussing a number of questions, which have been sent to each member with a request for an answer to be prepared to one at least.

ROADS FOR MODERN TRAFFIC.

Last Tuesday at the Institution of Civil Engineers, the discussion on the two papers on the subject of roads, a summary of which was given in the "JOURNAL" for the 27th ult., was concluded, after an adjournment from the previous week; and as the subject is one that appeals to the gas engineer from the point of view of the protection to be afforded to his mains from damage by heavy motor waggons, and also by reason of a possible extended market for the disposal of his tar, it will be of interest to supplement our notice of the papers by some reference to the lengthy discussion.

Sir John Thornycroft commented upon what he thought were the better roads of France, and their greater freedom from dust. There was, he said, less economy possible in repairing roads in small sections than in longer portions. Mr. J. C. Inglis, Manager of the Great Western Railway, thought a more central authority to control the roads was required, as the smaller the authority the worse was the condition of the roads. Even in Ireland the roads were better than in England, which was partly due to this very reason of larger authorities with better engineers. The next speaker (Mr. Howard Humphreys), in a very able speech, emphasized the same point. There were 1850 local authorities in England and Wales concerned in the repairs of the roads; and it was hardly an exaggeration to say that there were 1850 different methods of repair. Fresh legislation was needed in regard to the control of highways; for how could uniformity of character be expected until there was governmental control? The nation should contribute toward the expense of upkeep; and there should be equalization of outlay between the Metropolitan Counties and others. The control of bridges was even more confusing than that of the roads. Generally speaking, if a line was drawn diagonally across England, the south-east part of it would be a soft-stone country, and the north-west portion a hard-stone district. The local authorities must find out when the point was reached at which the local stone for roads ceased to be the most economical. If the country would make the roads, the roads would make the country.

Representatives of county councils also joined in the discussion, and pointed out that the financial aspect of the question was the difficulty. The only solution possible was for the Imperial Exchequer to give grants. Mr. R. J. Thomas, the County Surveyor of Buckinghamshire, endorsed the general demand for increased jurisdiction to be given to the county councils. He had used "tarmac" for 2½ years, and had found it answer "uncommonly well." Tar paint for the road cost 1d. per square yard, or about £55 per mile. So successful had it proved, that several residents had contributed toward the expense of it, as they profited by the absence of dust and its other advantages. The engineer in charge of the experiments in progress on the roads near Maidstone spoke, and referred to the difficulty of making comparisons between roads of different construction, and between the various attempts at dust preventing, unless they were all subjected to the same amount and kind of traffic. In Kent, they were going to test the same roads with different materials in turn, so as to arrive at as fair a conclusion as possible. To create a really economical road, said another speaker, there must be uniformity in the material used. A mixture of limestone with other ballast was not advisable. Sir John Wolfe Barry remarked that, if one wanted to spoil a road, it could not be better done than by putting a footpath down the middle of it, as was suggested in the "twin road" illustrated on p. 578 of the "JOURNAL" for the 27th ult. The same applied to putting pillars down the middle of a roadway. Several other speakers who joined in the debate emphasized the point that the roads and the vehicles were to be regarded as one and the same; and also that the total wear and tear was to be considered, not only that of the road itself.

Time did not allow of the authors of the two papers replying to the discussion.

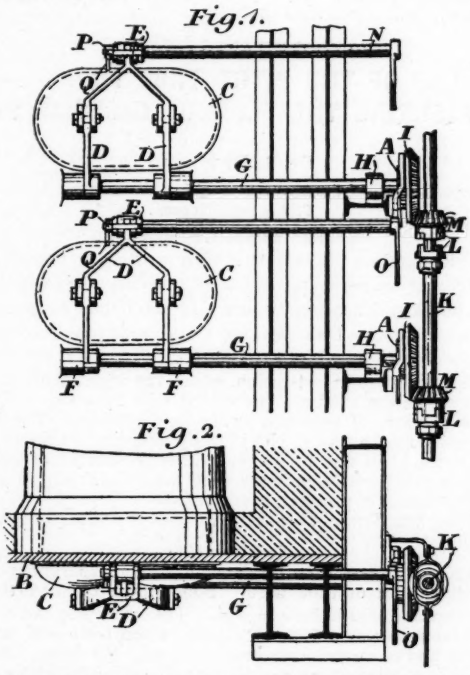
The South Metropolitan Company's Coal Contracts.

The remarks by the Chairman of the South Metropolitan Company, at the recent half-yearly general meeting, on the subject of the supply of coal, naturally aroused considerable interest, and led to some inquiries being made on the matter. With regard thereto, we have good reason for believing that the following are the facts: The Durham coalowners decided to ask for an advance of 1s. 3d. per ton on last year's prices; and even more was demanded for one particular coal. But when some of the owners were informed that the Company, while objecting to the proposed advance, were willing to pay an extra 6d. per ton, they came down to 1s., for which, it appears, they are standing out. Finding that their offer of 6d. per ton would not be accepted, the Company increased it to 9d., on which figure they expressed their intention of standing firm. We believe that this attitude has had the desired effect, and that two contracts have already been entered into at the increase named, while others are expected to follow. The Company are engaged in a hard struggle; but they hope to come out of it successfully. The advanced price of coal is not the only matter which is causing the Directors anxiety. There will be some rise in freights; but it is thought that it will not be more than 1½d. per ton—indeed, it is said that arrangements have been made for several ships at this figure.

OPENING AND CLOSING VERTICAL RETORTS.

The attention which is now being given to the subject of vertical retorts—as the result of their adoption, in this country and in Germany, for the ordinary work of gas making—invests with special interest any improvement in detail calculated to render these appliances more efficient. It is for this reason that we give some particulars from the specification of a patent taken out by the Dessauer Vertikal Ofen Gesellschaft towards the close of last year, for improvements in the mechanism for opening and closing retorts of this kind.

The patentees point out that when vertical retorts are employed for the manufacture of coal gas, it is necessary to actuate the lower fastenings from the interior of the furnace—first, because it is dangerous to remain underneath the furnace when a retort is opened, owing to the fall of the mass of incandescent coke; and, secondly, because access to the fastenings is difficult, owing to the presence of the receptacle to catch the coke. The present invention has reference to simple and safe mechanism to facilitate work and avoid danger. For closing the retorts, lids are employed which open downwards, and are furnished with the Morton fastenings. Two methods of constructing the present appliance, the subject of the invention, are shown in the accompanying diagrams—fig. 1 being a view from below, and fig. 2 a transverse section of a furnace.



The Dessau Patent Arrangement for Opening and Closing Vertical Retorts.

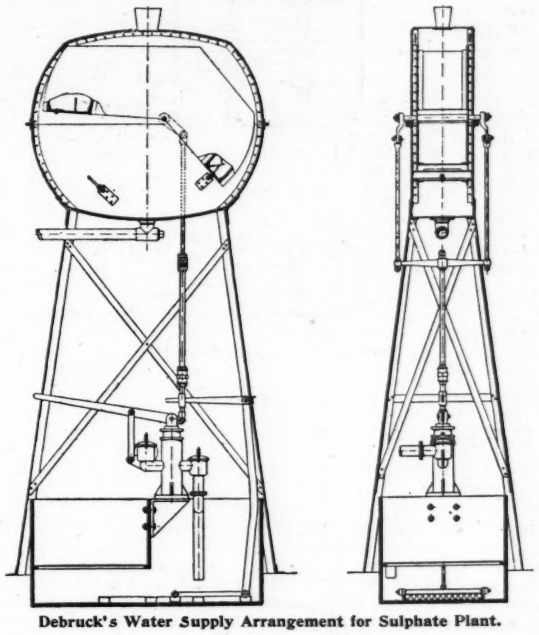
A is the lower end of the retort; B, the cast-iron plate on which it rests; C, the lower lid of the retort; D, the fastening; and E, the corresponding catch. The lid C can rotate in two sockets F cast on the plate B. This movement is obtained by means of the shaft G, which extends as far as the side of the furnace. This shaft is supported at H, and comprises a bevel-wheel I, gearing with the rack M, mounted loosely on the shaft K, and brought into action by the toothed gearing L. To the shaft K can be given a rotary motion forwards and backwards by means of a crank and handle not shown in the diagram. The catch E, which keeps the lid shut, can turn on two eccentrics keyed on to the shaft N.

The appliance described works as follows: To open the retort-lid C, the shaft N is moved by means of the lever O. The entraining piece Q then strikes the pin P, the catch E turns until it has released the end of the fastener D, so that the lid (since the toothed gearing L is out of gear), opens downwards by its own weight under the column of coke which it supports. The retort can thus be emptied without any difficulty. To prevent the open lid swinging like a pendulum, and preventing the fall of the coke, it is secured by a catch, spring, or any other suitable device. To close the lid, the cogs at L are made to gear after releasing the catch; and by means of the crank-handle the shaft G is turned until the lid rests on its seat. Then the eccentric shaft is turned in the opposite direction, so that the catch E is brought above the end of the fastener D, and firmly wedges it against the lid. Thus, by one movement, the fastening mechanism is released and the lid is loosened; then, for closing, the lid is grasped, brought down, and firmly pressed into position.

NOVELTIES IN SULPHATE PLANT.

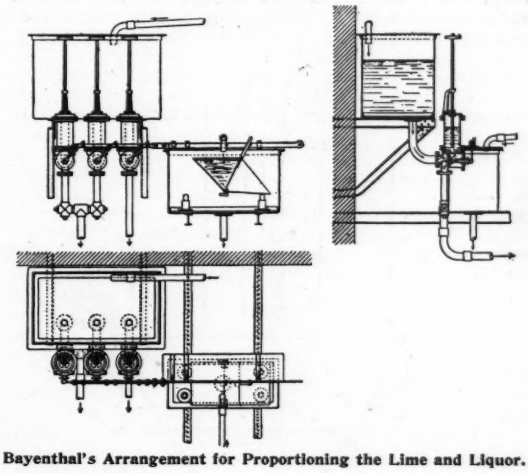
A paper was read by Herr A. Peters, of Cologne, before two of the Provincial German Gas Associations last autumn, in which the author drew attention to the loss of ammonia that occurs in many liquor works through the employment of untrustworthy hand labour and inefficient condensing apparatus. He pointed out that losses of this kind could be avoided by an installation of automatic arrangements which are not costly, but save their expense in the greater quantity of sulphate, &c., recovered from the liquor. His communication has been recently printed in the "Journal für Gasbeleuchtung," whence the following particulars have been derived.

An apparatus has been devised by Debruck, of Düsseldorf, in which the water used in the condensers is made to flow through



Debruck's Water Supply Arrangement for Sulphate Plant.

a tipping arrangement, which is connected with an agitator placed in the lime store-tank and with the piston of a pump which lifts the lime water into the liquor still. The supply of water to the tipping vessel can be regulated by a cock, so that the feed of lime is proportioned to the volume of liquor worked up. The water escaping from the vessel can be used for coke quenching, or, since it is not contaminated with foreign matter in any way, for any other purposes that may be desired. In a somewhat analogous apparatus invented by Bayenthal, the lime water is raised into an overhead receptacle, whence it descends into three

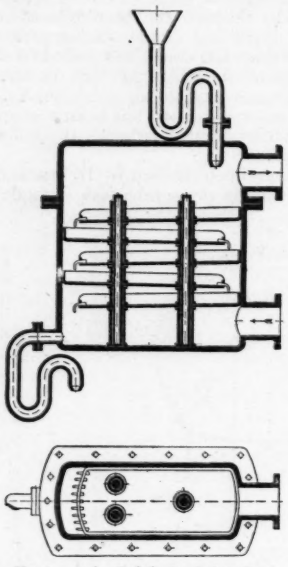


Bayenthal's Arrangement for Proportioning the Lime and Liquor.

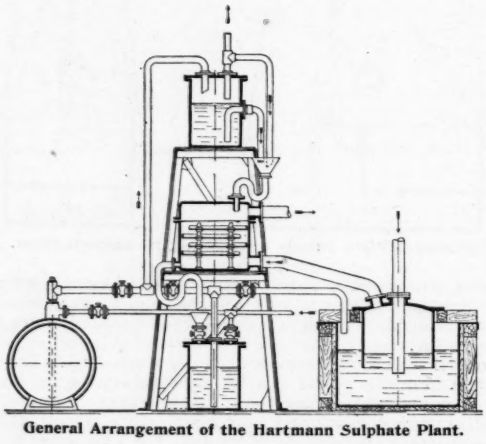
measuring vessels, the outlets of which are connected together. The liquor flows through a tipping arrangement, which opens the cock on one vessel every time it falls over, so that the supplies of liquor and of lime to the stills are correctly proportioned.

An apparatus has been patented by Hartmann for avoiding the loss of ammonia which takes place from ordinary saturators when the acid is approaching neutralization. The vapours leaving the saturator are caused to enter the base of a lead-lined cylinder containing a number of sloping trays charged

with sulphuric acid from a constant supply at the top. At their alternate ends the trays are fitted with depending glass tubes terminating in fine jets, so that acid falls in thin streams from an upper tray to the one next lower. The vapours

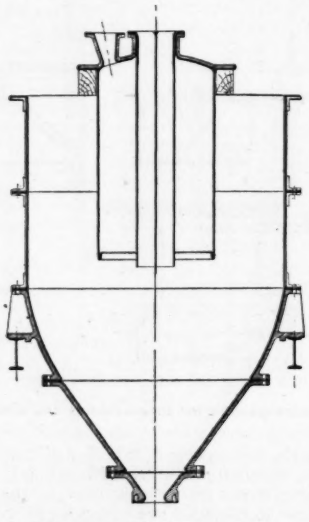


Hartmann's Sulphate Saturator.



General Arrangement of the Hartmann Sulphate Plant.

ascending between the trays have thus to pass over the acid in each, and to force their way through the rain of acid. It is found preferable not to allow the acid issuing from the base



Wolter's Sulphate Saturator.

of the catch-pot to flow into the saturator, but to retain it in a separate receptacle, whence it is blown into the saturator when the latter is being re-charged. If this were not done, there would be delay in reaching the neutralization point in the saturator.

A continuous plant for sulphate manufacture has been patented by Wolter. In this apparatus, the saturator is a vertical cylinder with a conical base terminating in a cock with very wide bore. At its upper part, it carries the usual bell and vapour inlet-tube. The vessel is of such dimensions that a crop of crystals worth removing accumulates in the cone at convenient intervals—four or six times per day. The crystals are extracted by simply opening the cock, whence they fall directly into a centrifuge. The adhering liquor, driven off by the centrifuge, collects in a suitable vessel, whence it is blown back into the saturator; fresh acid being added from an overhead store-tank. The operations of shutting off the saturator, emptying it, drying the sulphate, returning the acid, and bringing the plant into work again, occupy only five minutes. A plant of this kind arranged in duplicate, for the treatment of 13,000 gallons of liquor per day in each half, has been erected at the Abendröthe Mine, near Rothenbach. The crude liquor contains about 1 per cent. of ammonia; and the recovery is so good that the waste product does not retain more than 16 or 18 grammes per cubic metre. The whole plant is looked after by two men—one on the day shift, the other on the night shift; whereas ordinary sulphate plants of the same capacity would require as many as eight men.

Herr Peters also remarks that, in a good plant, the fresh liquor should be warmed at the expense of the waste; and where it is possible, the cream of lime should be heated similarly. The pressure after the reducing-valve should not exceed 0·15 to 0·3 of an effective atmosphere. The lime should be supplied in a thoroughly well subdivided condition.

THE USE OF THE PITOT TUBE FOR MEASURING THE FLOW OF GASES IN PIPES.

By R. Burnham,

Professor of Experimental Engineering at the Armour Institute of Technology, Chicago.

[From "Engineering News."]

Notwithstanding all that has been written in regard to the pitot tube as an accurate means of measuring the velocities of fluids, doubt still apparently exists in the minds of many engineers as to whether the claims for it have been fully substantiated by experimental proof.

In nearly every investigation where the instrument has been employed, its use has been preceeded by a laborious calibration for the purpose of determining its true formula. The lack of accordance in the results obtained by different observers has, in some cases, been due to the experimental difficulties attending the work, and more often to the effect upon the rating of the form and dimensions of pressure tube used.

The working formula for the pitot tube is ordinarily taken as

$$v = K\sqrt{2gh},$$

where K is a constant to be determined by experiment for the particular form of tube used. Some have claimed the true theoretical formula to be $v = \sqrt{gh}$. The writer has had occasion to use the instrument to some extent in the testing of fans and blowers, and in experiments connected with the flow of gases in pipes. In this latter connection, an unusually favourable opportunity was presented, through the courtesy of Mr. C. W. Bradley of the People's Gaslight and Coke Company of Chicago, to carry on a careful series of experiments for the purpose of rating pitot tubes. These experiments were conducted by Messrs. H. A. Dreffein and E. M'Burney, as the basis of a thesis in mechanical engineering. It is the object of this paper to describe briefly the method of conducting the experiments, and to present the results obtained as showing the practical accuracy of which the pitot tube is capable.

A form of tube was designed which could easily be duplicated, and which at the same time conformed, in the main features, to forms reputed to give good results when used by other observers. The instruments, fig. 1, were made up of two brass tubes, one within the other, the inner tube, $\frac{3}{16}$ inch outside diameter and $\frac{1}{32}$ inch thick, forming the velocity tube. The outer or pressure tube is made of $\frac{3}{8}$-inch tubing, $\frac{1}{32}$ inch in thickness, provided with a slot $\frac{1}{16}$ in. by $1\frac{1}{4}$ in. on the underside of the horizontal portion, for the admission of pressure. Tips of various forms may be attached to the velocity tube; but in the present case the ones shown were used. As a matter of fact it was demonstrated that the form of tip, within quite wide limits, makes no appreciable difference in the indications of the tubes. The pressures exerted were transmitted through rubber tubing, attached at B and G, to opposite sides of sensitive manometers, reading to thousandths of an inch of water. The arrangement of the tubes in the stuffing-box, as shown, permits a longitudinal movement, and also some lateral adjustment, in the event of the hole in the pipe not being tapped exactly perpendicular to the axis. The position of the tube with reference to the centre of the pipe is indicated on a graduated scale by the pointer T.

The facilities for carrying on the experiment consisted of two large illuminating gasholders having capacities of 900,000 and 2,000,000 cubic feet respectively, communicating with each other

through a 24-inch cast-iron main, free from bends or obstructions of any kind for a length of about 150 feet. A Root exhauster, capable of delivering 17,000 cubic feet per minute, served to draw the gas from the smaller and deliver it into the larger holder; the velocity of flow being controlled by the speed of the exhauster.

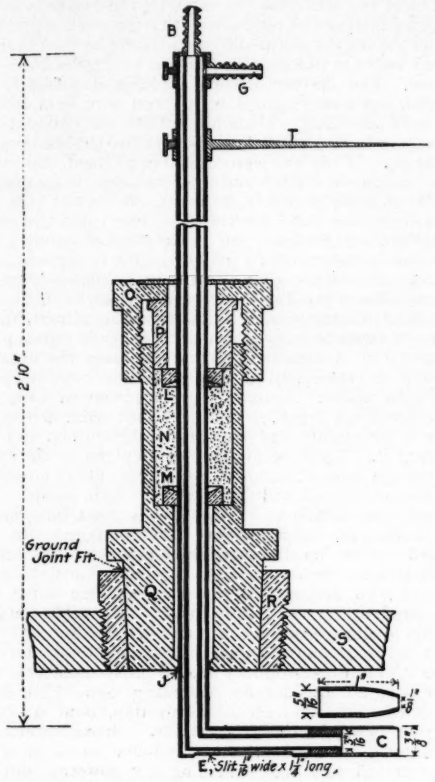


Fig. 1—Section Through Pitot Tube and Stuffing-Box, Used on Gas-Main.

The normal pressure in the large holder was several inches of water in excess of that in the smaller, which permitted the gas to be returned at any desired velocity by the manipulation of a bye-pass valve in the line.

Two pitot tubes were inserted near the middle of the straight portion of the pipe, and a thermometer midway between the tubes, for indicating the temperature of the gas. One pitot tube was used to measure the velocity of the centre of the pipe, and was kept constantly in that position. The other tube was arranged to be moved across the diameter of the pipe—its exact position being indicated on a graduated scale. Both tubes were connected to manometers in such a way as to indicate at any instant the static pressure and the velocity head.

The true mean velocity of the gas was obtained by recording the rise or fall of the smaller holder at frequent intervals during the run, and computing the volume displaced in cubic feet per second from the known dimensions of the holder. This, reduced to the temperature and pressure recorded at the pitot tubes and divided by the cross-sectional area of the pipe in square feet, gave the mean velocity in feet per second. The mean velocity is defined as that velocity which, when multiplied by the cross-sectional area of the pipe, will give the volume discharged. The theoretical mean velocity, according to the equation $v = \sqrt{2gh}$, was determined in the manner explained later, from pitot tube readings of the velocity head, taken at several points from ½ inch to 1 inch apart across the diameter of the pipe. The ratio between the true mean velocity and the mean velocity as deduced from the pitot tube was taken as the value of the constant K in the formula $v = K\sqrt{2gh}$. Reliable data were secured for gas velocities of from 35 to 65 feet per second.

In computing the volume of gas-flow from the holder displacement, account was taken of the correction due to the expansion of the gas in the holder. Except when the sun was shining, however, the correction was practically negligible. The density of the gas was found to vary to some extent; hence frequent analyses were made, from which the weight per cubic foot was computed for each run.

TABLE I.—*Data obtained with a Pitot Tube on a Gas-Main during a Typical Run (No. 3; May 25, 1905).*

[Bar., 29·22 in. mercury; pressure in holder, 4·11 in. water; weight of gas per cubic foot, 0·0476 lb.; average static head in pipe, 4·52 in. water; area of holder, 16,290 sq. ft.; diameter of gas-main, 23·75 in.]

Time.	Temperature of Gas Deg. Fahr.	Holder Displacement.		Velocity Heads at Centre of Pipe, In. Kerosene.		Velocity Heads Measured across Diameter of Pipe, In. Kerosene.		Location of Tube Distance from Centre In.
		Feet.	Feet per Min.	H_1.	$\sqrt{H_1}$.	H.	$\sqrt{H}$.	
11·58	67·0	10·27		0·355	0·596	0·340	0·583	Centre.
			0·484	0·330	0·574	0·310	0·556	1·44
12·05	65·1	13·66		0·370	0·608	0·340	0·583	3·44
				0·375	0·612	0·320	0·566	5·44
				0·380	0·616	0·310	0·557	6·44
			0·496	0·360	0·600	0·300	0·548	7·44
				0·380	0·616	0·290	0·538	8·44
				0·360	0·600	0·270	0·519	9·44
12·10	63·2	16·14		0·370	0·608	0·250	0·500	9·94
				0·370	0·608	0·240	0·490	10·44
				0·375	0·612	0·220	0·469	10·94
				0·375	0·612	0·155	0·394	11·44
			0·490	0·370	0·608	0·220	0·469	10·94
				0·380	0·616	0·230	0·479	10·44
				0·375	0·612	0·245	0·495	9·94
				0·370	0·608	0·275	0·524	9·44
12·15	63·0	18·59		0·370	0·608	0·290	0·538	8·44
				0·380	0·616	0·300	0·548	7·44
				0·375	0·612	0·320	0·568	6·44
				0·370	0·608	0·330	0·574	5·44
			0·488	0·370	0·608	0·340	0·583	3·44
				0·350	0·592	0·340	0·583	1·44
				0·365	0·604	0·355	0·596	Centre.
12·20	61·8	21·03		0·365	0·604	0·360	0·600	,,

Deduct 0·0009 foot per minute from holder displacement to allow for expansion h, in inches of water = H ÷ 1·038.

Table I shows the data obtained in a typical run; the mean velocity of the gas being 43 feet per second. It will be observed that the manometer readings were taken in inches of kerosene. These are reduced to inches of water by dividing by 1·038.

The theoretical velocity in feet per second is obtained from the pitot tube manometer readings by substitution in the equation, $v = \sqrt{2gH}$, where H is the equivalent velocity head in feet of gas, which becomes,

$$v = \sqrt{\frac{2 \times 32{\cdot}16 \times 62{\cdot}4}{D} \times \frac{h}{12}} = 18{\cdot}288\sqrt{\frac{h}{D}}$$

where h is the velocity-head in inches of water ($h = H \div 1{\cdot}038$) and D the weight of 1 cubic foot of gas at the temperature and pressure in the pipe.

The method of deducting the theoretical mean velocity from the pitot tube readings will be understood by reference to fig. 2. The area of the pipe cross-section is represented by a circle of radius R. The right triangle O A B is so constructed that the base is equal to R, and the altitude equal 2π R. The area of the triangle, then, is equal to the area of the circle, πR^2. Also, the area of an annular ring, of radius r, and width dr, may be represented by a vertical lamina whose area is $2\pi r\,dr + \pi dr^2$. If the velocity of the gas were the same at all points in the cross-section, the quantity flowing through the pipe per unit of time would be equal to the product of the velocity and the area O A B. The velocity is not uniform, however, but varies with the distance from the centre, being assumed to be the same throughout any annular ring of width dr. Hence, the volume flowing might be found by taking the summation throughout the section of all the products.

$$V_1(2\pi r_1 dr + dr^2) + V_2(2\pi r_2 dr + dr^2) + \&c. = \pi VR^2.$$

where V_1, V_2, &c., are the theoretical velocities as obtained from

TABLE II.—*Summary of Results obtained with a Pitot Tube on a Gas-Main during Six Runs.*

Number of Run.	1.	2.	3.	4.	5.	6.
Temperature of the gas, degrees Fahrenheit	59·00	61·00	64·00	60·00	67·00	60·00
Barometric pressure, inches of mercury	29·22	29·66	29·22	29·66	29·48	29·60
Pressure in holder, inches of water	5·32	5·30	4·11	5·33	5·32	4·11
Pressure in pipe, ,, ,,	5·65	5·65	4·52	6·13	5·41	4·11
Weight of 1 c. ft. of gas at temp. and pressure in pipe lbs., D	0·0483	0·0507	0·0476	0·0508	0·0497	0·0508
Actual flow of gas reduced to temp. and pres. in pipe, c. ft. per second	106·30	125·60	132·40	173·20	177·80	200·50
Corresponding mean velocity, feet per second	34·50	40·70	43·00	56·20	57·70	65·10
Velocity at centre of pipe according to Pitot tube, do.	40·20	47·45	49·90	63·55	66·30	72·50
Mean velocity as determined from Pitot tube readings, do.	34·40	40·40	43·00	56·50	57·20	64·60
Ratio of mean velocity to velocity at centre	0·857	0·851	0·862	0·889	0·863	0·891
Mean velocity radius, inches	9·24	8·94	9·20	8·94	8·84	8·69
Value of the constant K, in formula $V = K\sqrt{2gh}$	1·001	1·007	1·000	0·994	1·008	1·009

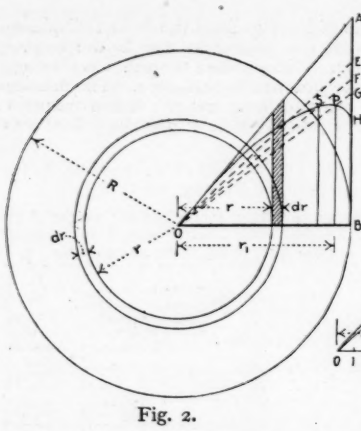


Fig. 2.

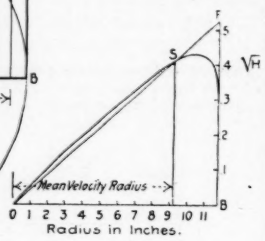


Fig. 3.

Figs. 2 and 3.—Diagrams Illustrating the Methods of Deducing Mean Velocities from Pitot Tube Readings.

the pitot tube readings at radii r_1, r_2, &c., and V is the theoretical mean velocity. This is accomplished graphically, in a practical way, by laying off these velocities as B G = V_1, on any convenient scale, along the altitude A B. The intersection of O G, and the ordinate erected at the extremity of the radius r, determines the point, P, on the curve O S P H. In a similar way other points are found. It can be shown then that the quantity of gas flowing per unit of time is proportional to the area under the curve. The mean velocity is found by constructing the triangle B O F equal to the area under the curve; whence B F is proportional to the theoretical mean velocity, and the intersection S determines the mean velocity radius. If B E be laid off proportional to the actual mean velocity, as found by dividing the flow in cubic feet per second by the area of the pipe, then B E O ÷ B F O is the value of the constant K, in the equation, $V = K\sqrt{2gh}$. Since these relations hold, whatever the scale or units adopted, the $\sqrt{H}$ may be plotted instead of the computed velocity.

Fig. 3 shows the actual curve obtained from the data given in Table I.

Table II. gives a summary of the results obtained from six runs, showing the following average values:—

Mean velocity radius, 8·97 inches, or 70·4 per cent. of the pipe radius.	
Ratio of mean velocity to velocity at centre	0·869
Constant K	1·003

From these experiments then, it may be concluded that a pitot tube of the form used is a perfectly reliable instrument for measuring the velocity of gases; its constant may be taken as equal to unity; it indicates velocity head exactly in accordance with the law, $v = \sqrt{2gh}$.

While the writer is not the first, by any means, to present experimental proof of the above facts, yet the applications of the pitot tube to experiments with the flow of gases have been comparatively few, and not always accordant in the conclusions arrived at. He hopes, therefore, that his results may be of some interest.

THE DIVINING ROD IN GERMANY.

A recent number of the "Journal für Gasbeleuchtung" contains two more articles discussing the true value of the divining rod as a means of finding subterranean water—a subject to which much attention has been drawn lately owing to the favourable notice bestowed upon it some time ago in the "Zentralblatt der Bauverwaltung" by a German Privy Councillor of scientific repute.

The first article is by Herr Ehlert, of Düsseldorf, pointing out that water is sometimes "discovered" by the rod in places where any man of common sense or power of observation would know that it must be present—*e.g.*, spots where climbing roses constantly refuse to grow, or where there is a moist place in the ground whenever the weather is damp. Nevertheless, Herr Ehlert holds that many diviners are perfectly honourable men, absolutely possessed with a sense of their power. The major portion of his contribution is taken up with a discussion of the results obtained when wells have been sunk in situations indicated by a certain individual, of whose personality he speaks in terms of high respect. The author goes at great length into the phenomena noticed on a certain piece of ground to which this diviner was called. The ground lies alongside a river, the earth in the neighbourhood being soil, detritus, gravel, with clay underneath which has not been pierced. A well giving a large amount of water was in existence; but it contained too much iron to be of any service. A second deeper well was then dug not far away; but the owner of the ground feared that the supply of good water so obtained would be insufficient. The diviner came, but was not informed of the wells. Immediately above the former he said there was no water; but on being told of the circumstances, he stated that deep lying springs were present. He then walked over the ground, finding a spot (near the second well) where so much water should be met with that he "would be able to find the place again blindfolded," which he apparently failed to do.

Herr Ehlert remarks that the divining rod can only be proved to be a useful instrument by showing that its positive and negative indications are always justified by events, and by the diviner being able to find water in places where skilled geologists have asserted its absence. The diviner already mentioned formerly used a wooden rod, but now employs one of iron wire bent into a loop with the ends diverging. He holds it in the conventional position, but is "unable to find water" if he wears two rubber boots or two rubber gloves. If the rod were effective of itself, the method of holding it should not matter, and it should operate in any person's hands. Much more probably, however, the diviner relies upon a kind of instinct—for some work without rods; and the instinct in plain language is experience and recognition of country likely to contain water in the mind of a person unable to express his knowledge in scientific terms. This is practically shown to be the case by the admission of the diviner in question, who limits his searches to the parts of Germany with which he is acquainted, and where water always exists at some depth or other, while refusing to make investigations in mountainous districts (where the discovery of water would be beneficial), on the ground that "he has no experience" of such places. Again, a mere discovery of water, even at about the predicted depth, is of little value; what is necessary to be known is the quality and quantity of the supply, and the cost of obtaining it. These points are not divulged by the experts of the rod, though some diviners claim to give clients a notion as to whether the future well will yield much or little water.

The foregoing article is followed by a short note written by Herr H. Kullmann, a civil engineer of Nuremberg. He recounts several failures in the discovery of water made by another (a deceased) diviner, whose successes have previously been put on record, and who divined without the rod. He failed twice in choosing sites for a water supply to the town of Schweinfurt, and was equally unsuccessful some 24 years ago in the case of Nuremberg. At the latter place, he had undertaken to pay the expenses of sinking a well if his prophecy should prove incorrect, and consequently suffered considerable pecuniary loss. This man used to state that he felt a characteristic sensation about his diaphragm whenever he stepped over flowing water. On one occasion he was seeking water a few days after the publication of an article recounting his failures, and ridiculing his powers; and he was heard to say that in future he must put the depth at which the water would be found at 30 to 60 feet lower than before, so that such annoyances might not occur in the future.

Royal Commission on Canals and Waterways.

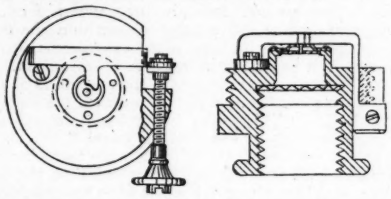
The King has been pleased to appoint a Royal Commission to inquire into the canals and inland navigations of the United Kingdom and to report on the following points: (1) Their present condition and financial position. (2) The causes which have operated to prevent the carrying out of improvements by private enterprise, and whether such causes are removable by legislation. (3) Facilities, improvements, and extensions desirable in order to complete a system of through communication by water between centres of commercial, industrial, or agricultural importance, and between such centres and the sea. (4) The prospect of benefit to the trade of the country compatible with a reasonable return on the probable cost. (5) The expediency of canals being made or acquired by public bodies or trusts, and the methods by which funds for the purpose could be obtained and secured, and what should be the system of control and management of such bodies or trusts. In view of the recent experiment in the driving of a canal barge by gas, we notice with special satisfaction the inclusion of Mr. W. J. Crossley, M.P., among the members of the Commission.

Analyses of Accounts of Gas Undertakings.—We have received the "Gas World" analyses of the accounts of gas undertakings for 1904-5. They are contained, as before, on four large sheets, 20 in. by 15½ in. (linen-backed for strength), bound in stiff cloth cover, and relate to 113 company and municipal undertakings—being three more than those given in the analyses for 1903-4. The new-comers are the Doncaster Corporation, the Drighlington Gas Company, the Dumfries Corporation, the Falkirk Corporation, and the Market Harborough Urban District Council—an addition of five; but, on the other hand, Rothesay and Todmorden drop out. At first glance, the mass of figures presented on each sheet seems a little confusing; but, as we have pointed out when noticing previous analyses, the eye is assisted by means of faint blue lines, dividing the whole of the names into groups of three, and also by the repetition, on the inner margins, of the figures indicating the numerical order. It only remains to say that the left-hand sheet of analyses furnishes particulars relating to the quantity of coal carbonized and of gas made and sold, as well as details relating to price, illuminating power, and revenue; while on the right-hand one will be found statistics in regard to manufacture, distribution, and management, the capital paid up, and the capital per ton and per 1000 cubic feet of gas.

REGISTER OF PATENTS.

Regulating Bunsen Burners.—Steinicke, T., of Berlin. No. 2186; Feb. 3, 1905.

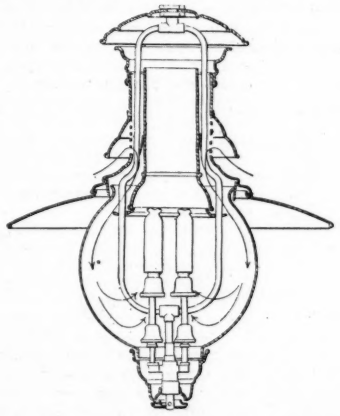
This invention has for its object to provide a nozzle for the admission of gas into the mixing-chamber or tube of a bunsen burner which allows of very nice adjustment of the central hole or holes from which the gas issues into the mixing-chamber of tube.



The patentee points out that sliding shutters have previously been used whereby the entire area of the pipe, or any given portion of it, can be closed, and that nozzles for bunsen burners are known in which the admission of gas is controlled by discs or plates placed one over another and in contact with each other—one of the discs or plates containing apertures for the issue of the gas, and the other containing corresponding apertures. On turning one of the discs, the apertures of the fixed plate become closed or reopened. But the discs or plates, being centrally placed upon each other, do not allow of adjusting an aperture placed in the centre, as the two central apertures would always register with each other. The use of an adjustable central aperture for the issue of the gas is, however, of particular advantage for certain lamps; and while regulating perforated discs have previously been eccentrically pivoted so as to regulate the central aperture, the improvement of the present invention provides (as shown) means for controlling particularly the central aperture of the nozzle, without interfering with the "hit and miss" action of the two plates as regards the other holes.

Incandescent Gas-Lamps.—Winkler, H., of Berlin. No. 2969; Feb. 13, 1905.

In incandescent gas-lamps used without glass chimneys, it can be frequently noticed, says the patentee, that the air for combustion, as supplied at the top is so drawn through the lamp that the flames are constantly agitated, with the result that the light flares and flickers.



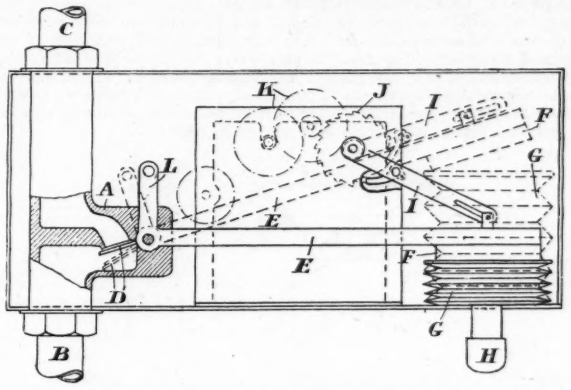
This defect is probably due to the fact that the air current entering from above has its direction of movement altered too soon, and has imparted to it, at the level of the incandescent body, a nearly horizontal direction; so that its motion can be easily communicated to the flames, which are disturbed and so flicker. The present invention has for its object to obviate this defect by providing a device for controlling the air current detachably secured to the end of the inner draught pipe or chimney, which may be of the ordinary conical or flaring shape, and a device arranged beneath the burner-head. These devices (as shown) may be used singly, but preferably in combination.

Actuating Gas-Cocks.—Neumann, W., Franke, A., and Eder, R., of Berlin. No. 3527; Feb. 20, 1905.

This invention relates to an automatic time-switch for gas-lights, so constructed that, by pressing a button, the gas supply for one or several burners is automatically opened, and after the lamps have burnt for a predetermined time the valve is automatically closed.

The casing shown contains the valve case A, which is connected with the main gas supply B and with the pipe C leading to the burners. The valve D is rigidly connected to an angle lever E, the long horizontal arm of which is provided with a counter-weight F at its free end, and rests on the top of a diaphragm or bellows G. A pneumatic pusher H projects from the bottom of the bellows through the wall of the casing, so that forcing air under pressure through a non-return valve in the bottom of the bellows (not shown) inflates the same. The lever arm E engages, by means of a pin, with a longitudinal slot provided in the end of a lever I, which is fixed to the axle of a catch-wheel J gearing with the clockwork K. The short vertical arm L of the weighted lever E is so arranged that it can be moved by any suitable means from outside the casing and secured in position.

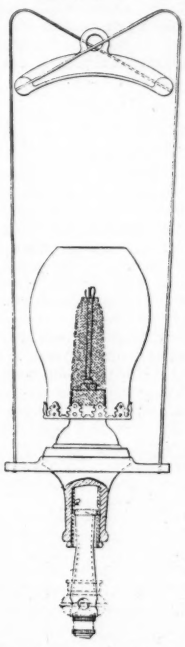
The apparatus operates as follows: In the position shown the valve D is closed. To light the lamps connected with the apparatus by means of their bye-pass flames, it is necessary to quickly press the pneumatic pusher—*i.e.*, to give it a series of rapid impulses (for which purpose the pusher is provided with a return spring, not shown), whereby the bellows G are expanded by the air coming from the pusher, and the weighted lever E is lifted into the position shown in dotted lines. The lever I is lifted with the lever E, and its pawl



engaging the catch-wheel J prevents the levers from dropping suddenly; so that they gradually sink according to the rotation of the catch-wheel operated by the clockwork K, which is then under increased weight—the air pressed in the bellows being allowed to escape thence through a non-return valve in the top of the bellows (not shown). When the lever E is lifted the valve D is opened, so that the gas is supplied to the burners and the lamps are lighted; and the valve is closed only when the lever has assumed its original position.

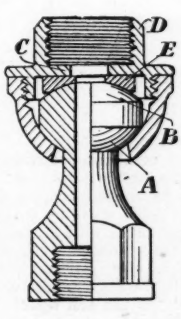
Anti-Vibration Arrangement for Incandescent Gas-Lamps.—Sutcliffe, H., of Halifax. No. 3298; Feb. 17, 1905.

In many forms of anti-vibrators, the patentee points out, the burner, with its mantle-support and mantle, are carried in or by a spring or yielding frame—such, for instance, as that described in patent No. 6547 of 1902—or in a frame or holder suspended from an overhead spring, or otherwise arranged to form a yielding support for the burner. In all these forms of anti-vibrators, it is necessary to have a yielding or expanding and contracting connection between the burner and the fixed gas-supply nozzle, so that the burner may move with its yielding support.



The patentee now proposes to employ a burner made in two parts—that is to say, the mixing-tube or burner-head carrying the refractory mantle is made separate from the bunsen tube. The latter is fixed to the gas-supply nozzle, and is furnished with air-admission openings in the usual way; and means are provided to regulate the air supply. The bunsen tube is made smaller in diameter than the mixing-tube, so as to slide freely within it. It is provided with an annular bead at its upper end, and is suitably contracted at a portion of its length, so as to allow lateral vibrations to be absorbed. The mixing-tube or burner-head carrying the mantle is carried by any suitable form of anti-vibrator or supporting frame over the bunsen tube; so that the tube passes up for a distance into the open lower end of the mixing-tube or burner-head, varying according to circumstances. The mixing-tube or burner-head with the mantle is thus free to move either vertically or laterally, independent of the fixed bunsen tube; so that vibration of the fittings is not communicated to the mantle.

Cup-and-Ball Joints for Gas-Fittings.—Brooks, B. W., of Stoke Newington, N. No. 5652; March 17, 1905.

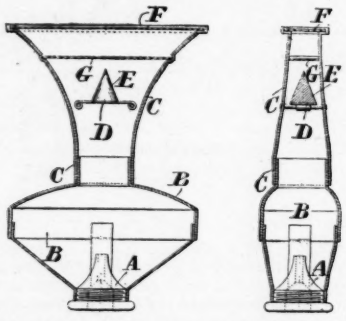


The patentee points out that, as ordinarily constructed, the usual cup-and-ball joint of gas-fittings depends for the most part upon the weight of the suspended fitting to render it gas-tight; and if the fitting be accidentally tilted too far, or lifted, an escape of gas at the joint ensues. To overcome this defect, he provides the upper side of the ball A (which is usually flat) with a spherical surface B, and between this surface and an internal flange C on the union D is a washer E. The upper surface of the washer is flat, and is free to slide in all directions in contact (more or less) with the underside of the internal flange. The under side of the washer is cupped to fit the upper spherical surface of the ball, and there is an orifice in the centre of the washer through which gas finds its way to the point of consumption.

Bunsen Burners.—Bier, G. & J. M., and Sensenschmidt, M., of Frankfurt a/M, Germany. No. 6662; March 29, 1905.

This invention relates to improvements in bunsen burners for water-heating apparatus, in which a device is employed whereby stopping up of the gas-jet outlet by falling water is prevented.

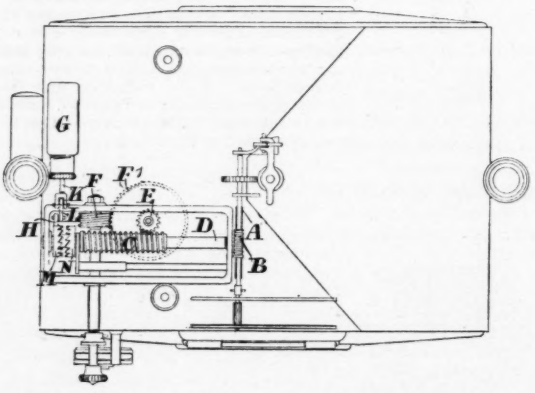
Screwed upon the single-hole gas-jet A is a rectangular mixing-chamber B, upon which is mounted a short, round burner-head C that at its top is flattened or contracted in one direction and widened out in the other, so as to form a flattened trumpet-mouthed extension of the mixing-chamber. The head carries above the gas-jet, and at a point considerably above the part of the mixing-chamber which has the smallest cross-sectional area, a plate D (flat or a solid), made as a vertically arranged upwardly-directed cone E, or a plate combined with the cone, or a plate downwardly bent around its edges.



At the top of the burner is a wide meshed wire sieve F, below which wide meshed wire sieves G are placed at fixed distances apart in the usual way, and in such manner as to produce the necessary resistance or the distribution of the issuing gas and to prevent firing-back and extinction of the flame. The wire sieves enable the condensed moisture which drips down to fall through without hindrance and without detriment to the burning flame. The drops of water which fall through the sieve are received by the deflector D, which, in order to prevent the striking-back of the flame, is well above the gas-jet—say, at least 1½ inches—and which, while of sufficient area, and so arranged as to deflect the water dropping on it away from the centre of the jet, is within the trumpet mouth of the mixing-chamber, so that the passage-way between the plate and the wall of the mixing-chamber is of such area as not to materially retard the flow of gas and air.

Stop Mechanism for Prepayment Gas-Meters.— Milne, J., and O'Connor. H., of Edinburgh. No. 8077; April 15, 1905.

In meters where mechanism is provided which enables the latter to be set to close a valve after a predetermined consumption, by gearing connected with the ordinary meter-registering mechanism, a hollow worm travels along a shaft rotated by the gas, and is connected so that the worm and shaft must rotate together. The worm, being free to travel axially along the shaft, is generally made to slide axially by a toothed wheel gearing into it; and when turned by suitable mechanism (which can be locked) the worm acts as a rack and the toothed wheel as the pinion, and the worm can be driven along the shaft to any predetermined distance. The passage of the gas through the meter revolves the spindle of the ordinary meter-registering mechanism, and, gearing with this, causes the shaft to revolve, and with it the worm. The worm being geared to the locked wheel (then acting as the nut), the worm, acting as a screw, travels back along the shaft in the opposite direction to the travel previously given it, until it reaches nearly the end of the shaft, when it closes a valve, compresses the spring on it, and thus prevents the passage of the gas to the meter. To open the valve when the worm is drawn back by the turning of the handle, a spiral spring is employed.



To enable the meter to be set so as to give small predetermined quantities, or multiples of these quantities, of gas, and also to close off the valve with greater rapidity, a crank is fixed to rotate upon the same centre as the shaft and connected to the valve shaft by a rod. There is also fixed on the crank a crown-wheel centered with the crank having saw-shaped teeth. On the end of the worm are one or more pins or pawls or a similar crown-wheel with saw-shaped teeth, so that when the worm has reached nearly the end of the shaft, the teeth engage with the teeth of the crown-wheel on the crank, and the pin and wheel, or the pawl and wheel, or the two wheels rotate together, and the crank pushes or pulls the valve spindle, as arranged, through the connecting rod, and thus closes the passage-way of the gas.

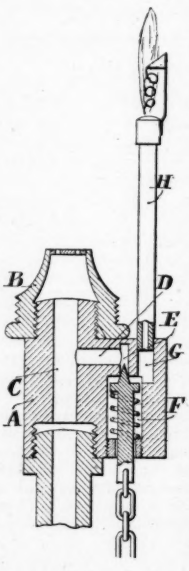
The number of teeth in each crown-wheel should preferably be the same, so that all the points of the one engage with all the points of the other. The number of teeth on the wheels may vary, but should preferably be of a similar number to the number of turns or half-turns which the locking mechanism has to be given to cause the worm to slide along the shaft the distance of one thread—in other words, a distance equal to the pitch of the thread. When the worm has been moved a short distance only along the shaft, and the points of the crown-wheels or crown-wheel and pins or pawls are out of engagement, the latter, owing to the number of teeth on the crown-wheel, are free to engage with each other, when the spindle with the axially moving worm upon it has made only a partial revolution.

A shows the gearing connecting with the spindle B of the ordinary meter-registering mechanism. A hollow worm C travels along a shaft D, rotated by the gas. This worm, being free to travel axially along the shaft, is made to slide by the toothed wheel E gearing into it, and is turned by suitable mechanism FF1 (which can be locked); the worm C then acting as a rack and the toothed wheel E as the pinion. The worm can thus be driven along the shaft D to any predetermined distance. The passage of the gas through the meter revolves the spindle B, and the gearing with this causes the shaft D to revolve, and with it the worm C. This worm being geared to the locked wheel E—then acting as the nut—the worm acts as a screw, and travels back along the shaft D in the opposite direction to the travel previously given it, until it reaches nearly the end of the shaft, when it closes a valve G, and thus prevents the passage of the gas to the meter.

To enable the meter to be set so as to give small predetermined quanties, or multiples of these quantities of gas, and also to close off the valve G with greater rapidity, a crank H is fixed so as to rotate upon the same centre as the shaft D, and is connected to the valve-shaft K by a rod L. On the crank H a crown-wheel M is centred with the crank H, having saw-shaped teeth. On the end of the worm C are one or more pins or pawls, or a similar crown-wheel N with saw-shaped teeth, so that when the worm C has reached nearly the end of the shaft D, the teeth on it engage with the teeth of the crown-wheel M on the crank H, and the pin and wheel, or pawl and wheel, or the two wheels rotate together, and the crank H pushes or pulls the valve spindle K, as arranged, through the connecting rod L, and thus closes the passage-way for the gas.

Automatic Gas-Igniters.—Schwarzhaupt, A., of Paris. No. 18,267; Sept. 9, 1905. Date claimed under International Convention, Sept. 9, 1904.

This invention relates to gas-igniters in which a pilot-flame is produced by causing a jet from a bye-pass tube to impinge on an igniting medium—such as spongy platinum or fine platinum wires; the pilot-flame being extinguished after igniting the main jet. In most igniters of this kind, a pointed valve normally closes the passage to the pilot-flame, but is capable of being pulled away from its seat by hand, so as to admit gas to the pilot-flame, and closes automatically by the action of a weight as soon as the operating connection is released; the arrangement being independent of the device controlling the supply of gas to the main burner.



According to the present invention, the igniter is controlled by a separate valve normally held closed by a spring; the opening and closing of the gas-supply pipe being effected separately (in the ordinary manner) by means of the usual gas-cock, while the igniter valve is used solely for effecting the ignition and the extinction of the pilot-flame. It is thus only necessary to open the communication between the supply pipe and the pilot-tube to produce the pilot-light, by pulling on a connection to the valve, on the release of which the valve close automatically.

The igniter comprises a short length of tubing A between the gas-supply pipe and the main burner B, and having a valve casing formed on it. The gas reaches the burner through the bore C, which is also in communication with a valve-chamber F, through passages D E. Into the chamber F a second passage G opens, which communicates with the pilot-tube H carrying the holder for the igniting substance. A pointed valve in the chamber F is seated in the end of the passage E where it opens into the chamber F, and is normally held against its seat by a spring, so that the gas cannot enter the chamber or the ignition-tube. A chain is connected to the valve so that it can be moved away from the seating when the gas will pass to the ignition substance, which becomes incandescent, and, in turn, ignites the jet. As soon as the draw-chain is released, the valve in F is pushed against its seat by the spring, and the passage E is thus closed automatically; so that the pilot-flame is extinguished.

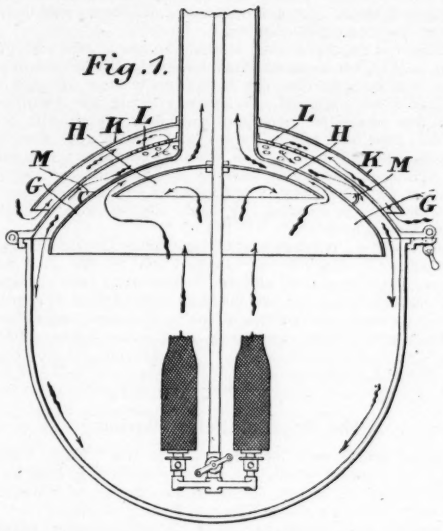
Incandescent Gas-Lamps.—Glover, J. G., of Queen Victoria Street, E.C. No. 20,088; Oct. 4, 1905.

The object of this invention is to provide means in an incandescent gas-lamp whereby any dust, dirt, &c., contained in the air to support combustion or mix with the incoming gas at the burner, "shall be efficiently destroyed, whereby the incandescent mantle is kept clean, and its life and condition greatly prolonged." Several such devices are illustrated and described in the specification.

Fig. 1 shows the lamp framing connected to a chimney and carrying

a glass globe, sealed to the globe ring, and secured air-tight to the framing by lugs and a cam-shaped catch suspended by a link from the framing.

Fig. 1.



Just under the framing is a hood G, depending from the chimney and situate inside the body of the lamp. Below the hood is a canopy H, fixed to the gas-pipe and carrying the burners and mantles. Above the frame is a shield or top K. The frame is perforated at L; and the incoming air to support combustion and admix with the incoming gas to the burners passes under the shield and through the perforations, down between the flame and the canopy, into the body of the lamp.

The heat and products of combustion in uprising first have action upon the canopy H, and then pass between it and the hood G to the chimney. In so doing, they impart heat to the canopy and hood, and also, by conduction, heat the frame of the lamp, so that the air, in passing to the burners, is heated to "such a degree that all dust, flocculent matter, or other light material becomes burnt and the air purified before it reaches the burners"—the debris being deposited in the channel M affixed to the hood.

Fig. 2.

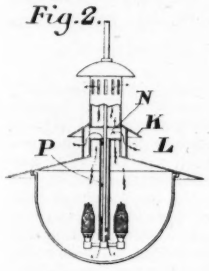


Fig. 3.

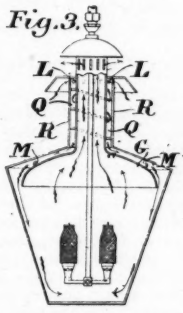
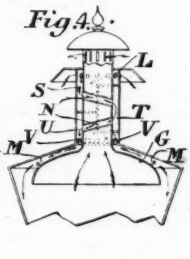


Fig. 4.



According to fig 2, the incoming air passes through perforations in the shield K, and then through tubes N, situate across the chimney, and down a tube P encircling the gas-pipe, to deliver the purified air to near the burners—the uprising products of combustion and heat having full effect on the tube P and cross tubes N. In this construction, the hood and canopy referred to above are dispensed with.

In fig. 3, the hood is retained, and surrounding the chimney is a spiral passage Q, enclosed by a wall R except to perforations at the top, through which the air passes into and through the spiral passage and into the body of the lamp through between the hood and framing; the uprising heat and products of combustion having full effect upon the hood and chimney to burn all materials entering with the air.

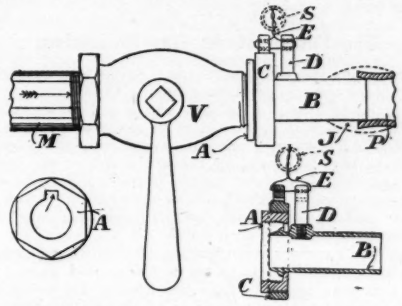
In fig. 4 (which is somewhat similar to fig. 3), instead of the spiral passage, two cross tubes N lead from and into chambers S, T, U; the air flowing through perforations into the chamber S, then through the top tube N into the chamber T, then through the bottom tube N into the chamber U, and then through the perforations V through between the hood G and the frame into the body of the lamp.

Tell-Tale Unions for Gas, Water, or Compressed-Air Meters.—Gaddum, C. E. W., and Pearce, H. A., of Manchester, and Williams, H. D., of Salford. No. 20,799; Oct. 14, 1905.

This device or union has for its object "to prevent theft of the gas or other fluid, by rendering it impossible to disconnect the valve or usual short attaching pipe by unscrewing the coupling nut, without such unscrewing leading to detection."

An illustration is given of the union applied in connection with the joining-up of the meter with the valve on the main pipe; also a sectional view showing the parts comprised in the union, and a face view of the coupling nut.

For the purposes of the invention, there is a coupling nut A, and a short tube or sleeve B, having a flange which the nut engages when screwed in position or attached, and binds it. The tube B has a coned end, so as to effect a fluid-tight joint with the valve or the supply main. Upon the coupling nut a collar C fits, having its interior shaped to correspond with the shape of the nut, and with an extension having holes formed through it. The collar prevents a spanner being applied to the coupling nut. The tube or sleeve is preferably somewhat thickened at the point where it is tapped; the coupling nut being formed with a groove or cut-away portion to allow it to avoid the thickened part when passed endwise into position. A pin or stud D



having a screwed shank, fits the tapped hole, and is formed with holes or slots.

In applying the device, the valve V is screwed hard up on the main pipe M, so that it cannot be further rotated; whereupon the coupling nut A and collar C are assembled on the tube or sleeve B, and this is connected to the short length of meter pipe P by wiped or other joint J, as usual. The coupling nut is now firmly screwed to the valve, so as to cause the coned end to make a good joint with it, and the collar C is slipped upon the nut. Then the pin or stud D is screwed firmly into position, and finally a wire is passed through the holes in the collar and stud, and the extremities are twisted together and a seal applied.

APPLICATIONS FOR LETTERS PATENT.

4643.—Potter, W. G., "High-pressure mains for intensified gas lighting for house-to-house supply." Feb. 26.

4644.—Potter, W. G., "High-power intensified incandescent gas lighting." Feb. 26.

4712.—Aldridge, J. G. W., and Gibson, R. E., "Charging retorts." Feb. 26.

4732.—Leeson, G. W. T., and Arkless, W. B., "Inverted and other atmospheric gas-burners." Feb. 27.

4756.—Warry, J., and Arculus, G. N. & A., "Inverted gas-lamps for railway carriages and tramcars." Feb. 27.

4765.—Brady, T. H., "Mantles." Feb. 27.

4771.—Mells, L., and Phillips, F. W., "Adapter for use with inverted incandescent burners." Feb. 27.

4872.—Sim, A., "Acetylene generators." Feb. 28.

4958.—Palethorpe, J., "Volume and pressure regulators for gas-engines." March 1.

4961.—Lea, J. E., "Measuring the flow of liquids." March 1.

5049.—Waring, C. E. D., "Ferro concrete tanks." March 1.

5068.—Helps, G., "Burners and mantle supports." March 1.

5086.—Bray, A., "Globe holders." March 2.

5100.—Morton, J., "Hot-coke conveyors." March 2.

5116.—Ward, E. A., "Removing obstructions in gas and other piping." March 2.

5152.—Elton, Sir E. H., and Stephens, R., "Lighting and extinguishing gas-lamps from a distance." March 2.

5194.—Thorp, T., "Anti-pulsators for gas-conduits." March 3.

5222.—Green, B. K., and Horn, C. A., "Producing gas for illuminating and heating purposes from petroleum, &c." March 3.

5226.—Bailey, A. J., and Smith, A., "Pressure reducing and regulating valves." March 3.

Inclined Retorts at Stockport.

The minutes of the Gas Committee which were submitted to the Stockport Town Council on Wednesday stated that a Sub-Committee had been appointed to inspect and report upon such of the coal and coke conveying plants as they considered suitable for the purposes of the Committee. It was also resolved that the Finance Committee be requested to make application to the Local Government Board for sanction to borrow £25,000 for the purchase and erection of inclined retorts and coal and coke conveying plant. Mr. Johnson asked if the old retorts were worn out. Alderman Clarke replied that the present retorts were put in in 1873, and they were now thoroughly worn out. In fact, as Chairman of the Committee, he would not take the responsibility unless they were removed. They had 132 horizontal retorts; and it was intended to put in 384 inclined retorts. The minutes were confirmed.

No Reduction in Price at Barrow.—Last month the Barrow Town Council referred back to the Gas Committee for further consideration a recommendation of the Committee that the price of gas should be reduced from 2s. 6d. to 2s. 3d. per 1000 cubic feet. On again being brought before the Council last week, the proposal was finally defeated.

Gas Profits at Lincoln.—The Lincoln Gas Committee resolved that the sum of £4000 should be placed at the disposal of the Finance Committee in aid of the general district fund for the ensuing year; and Alderman Wallis, in moving the adoption of this minute by the City Council, stated that it would make a total of £17,000 granted to the ratepayers by the Committee. The consumers had had £10,500 given to them in the reduction of the price of gas since the Committee took over the works. Mr. Black contended that the consumers had not been justly dealt with in the amount returned to them; but the minutes were confirmed, after a little discussion.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by Correspondents.*]

The Future of the Gas Profession.

SIR,—I see by the last number of the "JOURNAL" that Mr. George Helps undervalues the advice given to young candidates in my letter in your issue for the 20th ult. I did not advise old books exclusively to be read; but inasmuch as a start must be made somewhere, I did not think it advisable for a young student to rush *in medias res* at once, but to *read*. Bacon says: "Reading maketh a full man, conference a ready man, and writing an exact man. Therefore, if a man write little, he had need have a good memory; if he confer little, he had need have a present wit; and if he read little, he had need have much cunning to seem to know that [what] he doth not."

There is so much *emperic skill* floating abroad, that unless a student knows what has gone before he is apt to be carried away; and "the last state of that man is worse than the first." By every means possible let the student be informed well in all the details of the gas profession, and the time will not be long before suitable salaries are provided by gas committees. Let the profession expose every unjust method of the ignorant aspirant to obtain place, and thus keep the ranks free from hypocrisy and fraud.

AN OLD HAND.

March 7, 1906.

Purification Results at Chester and Stretford.

SIR,—I am exceedingly surprised to see in your issue of the 6th inst., a letter from Messrs. Samuel Cutler and Sons, in which they attempt to make capital out of figures that are not comparable.

The working conditions at Stretford and Chester are very different—the purifiers being of different sizes, and the make of gas smaller at Chester with the larger purifiers. At Stretford, the boxes in use are small for the make of gas; the speed of travel through the oxide being 0·032 foot per second, instead of 0·019 foot, as quoted by Mr. Belton at Leeds. There is no evidence that the condition of the oxide at the two works is the same—that the same kind of oxide is in use, or that the Chester crude gas contains the same quantity of sulphuretted hydrogen as the Stretford crude gas. The figures I gave for Stretford do not relate to the summer working at all, but only to the winter working, which, if the writer of the letter refers to the papers, he will be able to see for himself.

In future, I should advise Messrs. Cutler and Sons to make sure, before comparing figures relating to different works, that they are comparable, and not be led to set up unfair comparisons by a desire to obtain a cheap advertisement at the expense of a trade rival. Other figures were given during the discussion which, if Messrs. Cutler desired a fair comparison, would have told a very different tale. No gas engineer will take the figures placed in juxtaposition by Messrs. Cutler as evidence of the superiority of the system of grids adopted at the Chester Gas-Works, as everyone must profit by his own individual experience. We reduced our purifying costs by 45 per cent. by the use of one class of grids, and I have no doubt that Chester have done the same by another. To compare results taken, as these have been, without inquiry into the circumstances, is about as reasonable and as fair as would be the demand that Chester and Stretford should supply gas at 1s. 3d. per 1000 cubic feet because Widnes and Sheffield can do it.

H. KENDRICK.

Stretford, March 8, 1906.

SIR,—It is difficult to see how Messrs. Cutler and Sons' letter inserted in your last issue justifies their desire to make comparison without, at the same time, using your columns for trade purposes. Still, seeing that you have thrown your columns open for this purpose, I trust you will extend to me the same privilege.

At the outset, let me say that the figures given by Messrs. Cutler were selected to make their grids appear to be superior to mine, as is evidenced by the comparative table they have drawn up. While they were at it, why did they not tabulate all the statistics that were forthcoming during the discussion at Manchester on purifier grids? Seeing they have omitted particulars which throw a different light on the comparative results, I must enter the lists and fill up their omissions.

A word or two first as to the comparison between the Stretford results and those at Chester. It was pointed out at Manchester (and Messrs. Cutler have turned a "blind eye" to it) that the conditions at these two places were not equal. At Chester, they had larger purifiers, with larger connections, and better oxide. The oxide used by Mr. Kendrick contained nearly 50 per cent. of sulphur, which is hardly conducive to passing a large make of gas. Under the circumstances, it is not surprising that Mr. Kendrick should be perfectly satisfied with an increased efficiency of 133 per cent. obtained during the winter months. Results obviously vary at different works. The size of boxes, quantity of gas passed, and several other factors, enter into the consideration; and I am astounded they should seek to make capital out of a comparison that is subject to correction for so many factors, known and unknown.

If results, however, must be quoted, I crave your permission to point out one or two already achieved by the Spencer grids. At Elland, on Feb. 4, 1905, we installed a purifier 20 ft. by 20 ft. by 3 ft. 9 in., which ran till Aug. 14, 1905, and passed over 45 million cubic feet of gas, or 1,500,000 cubic feet per ton of oxide—a vastly superior result, be it noted, to Chester. Again, at Longwood we installed a purifier on July 27, 1905, 20 ft. square by 3 ft. 9 in. deep, which ran on till Nov. 28, and passed 35 million cubic feet of gas. This again works out at more per ton of oxide than the Chester results. It was pointed out in the discussion, too, that (though starting with new oxide) the test of sulphur from this box was 25 per cent. when taken out.

Now take the Oldham results with the Jäger conduit system, with the horizontal flow of gas, and purifiers 20 feet square and 4 feet deep. Mr. Duxbury remarked: "I must say that I am a long way behind my friends who talk about passing millions. I had to be satisfied with small mercies. With my old system, I could only pass in winter 1¾ million cubic feet per change through my oxide purifiers; but with the new Jäger system, I am able to pass 2¾ millions, or an increase of 120 per cent. per change of purifier."

The purifiers at Stockport only average 16 feet square and 3 ft. 3 in. deep—less in size, be it noted, than Oldham. From Mr. Meunier's remarks, it will be seen that the hurdle grids were adopted because they could be quickly applied. Where previously only 2 million cubic feet of gas was passed per change, during last winter, with a heavier make, he had been able to pass 12 million cubic feet per change.

Comparing Oldham results with those at Stockport, it is seen that, whereas Oldham purifiers only pass 2¾ million cubic feet per change, the Stockport purifiers pass 12 millions per change, or an increase of 5½ times—obtained, be it noted, by easily adapted and comparatively inexpensive hurdle grids.

Mr. Brearley, the President of the Manchester District Institution, is thus reported: "It was not an exaggeration to say that when all factors—cost, handiness, and efficiency—are taken into consideration, these and similar grids are, as far as purification is concerned, the greatest step forward which this generation of gas engineers has seen." This we believe to be true; and undoubtedly the ordinary flat grid is doomed.

WALTER SPENCER.

Elland, March 8, 1906.

The Price of Retort-Carbon.

SIR,—In an article recently published in the "Daily Telegraph," describing the General Electric Company's efforts to start an electric arc carbon works at Witton, Birmingham, it was admitted that the principal supply of carbon was obtained from gas-works.

At the present time, there appears to be a shortage of supply; and firms are persistently making inquiries for raw material. The price they are offering is 25s. per ton. Let me, however, point out that if owners of gas-works will hold their stocks, there is no reason why £2 per ton should not speedily be reached—this being the price we used to obtain.

This is another instance of the lamentable shortage of co-operation in the gas world. Why "give" the carbon away to our competitors?

LUX.

March 5, 1906.

We regret that our correspondent's communication came to hand just too late for inclusion in last week's number, and in publishing it now would point out that the matter to which he calls attention was referred to in our "Electric Lighting Memoranda" on Jan. 23 last (p. 213). Curiously enough, the "Morning Post" have just published an article dealing with the General Electric Company's operations; and this will be of interest in connection with "Lux's" observations. It is as follows:

THE CARBON INDUSTRY.

It is not perhaps generally known that there exists in England only one factory where carbon is made. It belongs to the General Electric Company, Limited, and is situated at that firm's works at Witton, Birmingham. The method of carbon manufacture is interesting. The raw material consists of gas-retort carbon, soot, and tar. The gas-retort carbon is obtained as a bye-product in the manufacture of gas; but the crude material as it is extracted from the gas-retorts is unfit to use before it has been carefully selected and cleaned, and the first process in the manufacture of carbons consists in this selection and cleaning. The selected carbon has then to be ground to a very fine powder. The soot used has to be specially manufactured for the purpose, and requires to be of certain definite physical and chemical constitution. The same also applies to the tar. . . . About 25 million metres of carbon are used in this country annually, yet the bulk of the trade is in the hands of German and French firms. The factory at Witton was established five years ago, at a time when the price was about 45s. per 1000 feet. The Continental manufacturers of the material formed a ring, and gradually reduced the price until it is being sold now in England at 23s. per 1000 feet—below cost price, and below the price at which it is sold abroad. It is another instance of dumping. The result has been that the output at Witton has not increased, and the manufacture of carbon in this country is in jeopardy. If the works were to be closed down, it would mean not only that hundreds of hands would be thrown out of employment, but that an important industry would be killed, and that all the carbon required by England would have to be obtained from abroad. Carbon is used extensively in the electric lighting of large areas; and also by the Admiralty for searchlights, and by the Trinity House for lighthouses. The firm's hopes were first in Protection; but these have been deferred for the time being. It is now felt that the Government departments, railway companies, and municipalities, in considering tenders for carbon, should, in order to keep in the country the manufacture of some part of the carbon used here, give a preference to the only British Company producing the material. The effect of the death of this British industry would be twofold, so far as the nation is concerned. The price of carbon would at once go to a very high level; for it is only kept low by the desire of the Continental firms to kill the British firm, and the Admiralty would be dependent, in war as well as in peace, on France and Germany for the supply of carbon for searchlights and for lighting dockyards. The General Electric Company's tenders for carbon are as a rule about 10 per cent. higher than those of Continental manufacturers. The keenest economist should not begrudge such an extra expenditure, when he considers that the amount of money spent on carbon is not great, and that the preservation of the industry in the country is of national importance.

The Macclesfield Town Council, after a very lengthy discussion, have decided not to proceed with a suggested electricity scheme, which would have involved an outlay of from £16,000 to £20,000.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills read a second time and committed: Accrington District Gas and Water Board Bill, Bury Corporation Bill, Cumberland Electricity and Power Gas Bill, Fulwood Urban District Water Bill, Holyhead Water Bill, Kidderminster Gas Bill, Llandrindod Wells Gas Bill, Mirfield Gas Bill, Newport Corporation Bill, Newtownards Urban District Council Bill, Wolstanton United Urban District Council Gas Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bill presented and read the first time: Heacham Water Bill.

Bills read a second time and committed: Cardiff Gas Bill, Derby Gas Bill, Dowlais Gas Bill, Epsom and Ewell Gas Bill, Gas Companies (Removal of Sulphur Restrictions) Bill, Merthyr Tydfil Gas Bill, Peterborough Gas Bill, South Metropolitan Gas Bill, South Suburban Gas Bill, Southampton Gas Bill, Sutton, Southcoates, and Drypool Gas Bill, Tottenham and Edmonton Gas Bill, Uxbridge Gas Bill, Watford Gas Bill.

The following Bills have been formed into groups:—

GROUP E.—Ascot District Gas (Electric Lighting) Bill [removed from Group A], Manchester Corporation Bill, New Mills Urban District Council Bill.

GROUP F.—Metropolitan Water Board Bill, South Suburban Gas Bill, Sutton, Southcoates, and Drypool Gas Bill.

The Cardiff Gas Bill, Dowlais Gas Bill, Epsom and Ewell Gas Bill, Merthyr Tydfil Gas Bill, Rochester, Chatham, and Strood Gas Bill, Thornton Urban District Gas Bill, Uxbridge Gas Bill, and the Watford Gas Bill have been referred to a Select Committee, consisting of Mr. H. J. Tennant (Chairman), Viscount Turnour, Mr. Howard Whitbread, and Mr. Hodge; to meet to-morrow.

ASCOT DISTRICT GAS (ELECTRIC LIGHTING) BILL.

Court of Referees—Tuesday, March 6.

This Bill came before the Court of Referees of the House of Commons—Mr. A. EMMOTT presiding—in connection with a petition which Messrs. Foote and Milne, Limited, sought to present, and to be heard on when the measure is considered in Committee.

Mr. C. HUTCHINSON, representing Messrs. Foote and Milne, Limited, said he asked the Court, in the exercise of their discretion under Standing Order 129, to grant him *locus* on the ground of competition. By clause 4 of the Bill, power was sought to extend the promoting Company's area of supply so as to include the parish of Chobham; but the main objection, so far as the petitioners were concerned, was to the power in clauses 15 to 24, relating to the supply of electricity by the Company in the parishes of Sunningdale, Sunninghill, Chobham, and Windlesham, in all of which, except Chobham, they were already supplying gas. The Gas Company desired to furnish electricity for light and power; so that the supply of gas and electricity for both purposes would be wholly in their hands without any possible competitor, if this attempt to shut him out on *locus* succeeded. The petitioners were the promoters of the Sunningdale and District Provisional Electric Lighting Order, 1906; and included in their proposed district of supply were the four parishes named. Procedure by Provisional Order was the special channel which the Legislature had devised as the proper means by which to obtain authority to supply electricity. The Gas Company were opposing them; but they (the Gas Company) did not deposit their Bill till December—several months after the petitioners had notified the Board of Trade of their desire to become the electrical undertakers for the district. The Gas Company in their objections to the proposed Electric Lighting Order submitted that the application to the Board of Trade was unnecessary and uncalled for, and that, as regarded the four parishes, it would set up competition with the Bill the Company were promoting—the very ground on which he asked for *locus*.

Lord R. CECIL (a Member of the Court): Have you any electric lighting powers at present?

Mr. VESEY KNOX (representing the Ascot Gas Company): None.

Mr. HUTCHINSON, continuing, explained that Messrs. Foote and Milne, for the purposes of the Order in its present stage, and at the moment it was granted, incurred all the obligations of promoters under the Electric Lighting Acts; it being the practice of the Board of Trade, in cases where they granted powers to an individual, or to individuals, to require that the powers should lapse unless within a fixed period they were transferred to a company. If the attempt of the Gas Company to get Messrs. Foote and Milne out of the way were successful, they would have an unopposed Bill containing powers far in excess of any which the Board of Trade could or would give to Messrs. Foote and Milne. Thus, if the petitioners obtained their Order, it would only be granted in the usual form; while if the Gas Company got their Bill, it would contain provisions removing them from all the obligations incurred by the Electric Lighting Acts—the result being that Messrs. Foote and Milne, in carrying on business, would be subject to the unfair competition of the Gas Company. In conclusion, Counsel quoted a number of precedents in support of his argument—among them being the proceedings connected with the Walker and Wallsend Union Gas Bill, the Jarrow and Hebburn Electric Supply Bill, the Bexhill and St. Leonards Tramroad Bill, and the Woking Water and Gas Bill.

Sir CHANDOS LEIGH (Official Referee): You contend that the Ascot Company, although they are an incorporated concern supplying gas, will, if they supply electricity, create new competition?

Mr. HUTCHINSON: Yes.

Lord R. CECIL: If you both had Bills in Parliament to supply electricity to this district, would you be entitled to be heard?

Mr. HUTCHINSON: Subject to the discretion of this Court; and I have never known that discretion not to be exercised in a petitioner's favour. He added that the petitioners had obtained the consent of two of the four parishes, and would obtain the consent of the other two.

Mr. VESEY KNOX submitted that, in the interests of convenience of procedure, the Court should refuse the *locus*. The procedure adopted by the Gas Company was that which they were bound to adopt in order to obtain authority to supply electricity. Being a statutory Company, they could only use their capital for the purposes for which they had been authorized to apply it. It would have been impossible for them to have proceeded under the Electric Lighting Acts for that reason, and also because those Acts did not authorize the Board of Trade to modify in any respect the power of a statutory company. They were bound therefore to apply for a Bill; and, in the ordinary course, but for the petitioners—who, so far as he knew, had no connection with the district at present—the Bill, in the House of Commons at least, would have been unopposed. But what would be the position if Mr. Hutchinson was granted *locus?* First there would be the proceedings, comparatively inexpensive, before the Board of Trade; and these the Gas Company would have a right to oppose, quite apart from the fact that they were seeking electrical powers, because they were already supplying gas for lighting and heating purposes in the area. The Gas Company's Bill was the first in a list to come before a Committee next week, by which time there was no probability of the Board of Trade having given their decision on the application for a Provisional Order of the petitioners; but if the *locus* were allowed, they would be opposed by a Company who had no connection with the district, and whose only claim to oppose them was that they were seeking an Order to authorize, not themselves, but another company to be formed hereafter, to supply electricity within the four parishes. Messrs. Foote and Milne had obtained two Electric Lighting Orders, in the same form as that for which they were now applying, relating to two other places; and they had not done anything under either.

Mr. HUTCHINSON said it was alleged in his petition that the Bill of the Gas Company would not have been promoted but for the application for a Provisional Order, and that the object of the Gas Company was to stifle competition.

Mr. VESEY KNOX said his instructions were quite different. Proceeding to show the inconvenience if the *locus* were granted, he said they would first have to go before a Committee and fight this Company.

Mr. BRYNMOR JONES (a Member of the Committee): Your position is very much better than if the Board of Trade had given the Order, is it not?

Mr. VESEY KNOX: Very much. I do not think I should have been here if the Order had been granted.

Sir CHANDOS LEIGH: If you say that, I think you come within the precedents.

Mr. VESEY KNOX, continuing, said Messrs. Foote and Milne would then come with a Bill to confirm the Provisional Order. The Gas Company would have no right to oppose that. Then the two Bills would go to the other House, and there at last they would get what would be the convenient course in such a case—namely, the reference of the two Bills to the same tribunal, which would decide, after hearing the two cases, what was the best way to supply electricity to the district. But they would only get to the tribunal after two abortive and expensive fights before separate Committees of the House of Commons. He submitted that this procedure would be very inconvenient, and that it distinguished this case from some of those to which Mr. Hutchinson had referred. If the petitioners obtained a Provisional Order, he would not deny that they had a right to be heard, because they would have come into existence in some sort of inchoate way. The Board of Trade recently communicated with the Agents for the Gas Company; and the latter had undertaken to insert in the Bill all the usual provisions in regard to electric lighting. He added that if the present Court refused the *locus*, the Gas Company would undertake not to petition in the House of Commons against the Bill to confirm the Provisional Order of the petitioners. This would facilitate the two Bills coming before a Committee of the Lords.

Lord R. CECIL: Would you undertake not to appear before the Board of Trade?

Mr. VESEY KNOX: No. There our position is quite different. We are entitled as a Gas Company to appear before the Board of Trade.

Mr. HUTCHINSON: In the opposition of my friend before the Board of Trade there is not a word about gas. It is all electricity.

Mr. VESEY KNOX went on to point out that the Gas Company, if they supplied electricity, would not establish new competition, but merely extend existing competition. Having the power to supply gas, the power to supply electricity was merely an extension of power.

The CHAIRMAN: The *locus* is allowed.

Mr. VESEY KNOX: Do you give it generally, or against the electricity portion of the Bill?

Mr. HUTCHINSON: I only want it against the electrical portion.

Lighting of Courts at Nottingham.—A resolution was moved by Dr. Milner, in the Nottingham City Council, to the effect that the Lighting Committee be instructed to provide, fix, and maintain in any private streets, courts, and yards, or other places within the city which are insufficiently lighted, such lamps and fittings as they may consider necessary for the proper lighting thereof, and supply the same with gas or other illuminant, in accordance with section 57 of the Nottingham Corporation Act, 1905. He remarked that the question had cropped up on many occasions; but they had been met with the excuse that the Council had no power to deal with it. The Act of last year, however, gave them this power. There were a large number of these badly-lighted places in the poorer parts of the city. Alderman Ford proposed, as an amendment, that the subject be referred to the Lighting Committee; and after some discussion this course was agreed to.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Friday, March 2.

(*Before Justices* RIDLEY *and* DARLING.)

Stoke-upon-Trent Rural District Council v. Staffordshire Potteries Water-Works Company.

This was an appeal by the defendant Company from a decision of Judge Mulholland, given at the Hanley County Court, in favour of the plaintiffs for £27 5s., under the following circumstances: By an agreement dated Aug. 1, 1894, the Company agreed to supply water to the plaintiffs for the village of Bagnall, which was within their sanitary district, and also within the area the Company were entitled to supply, but the circumstances of which did not enable the owners and occupiers to demand it. The terms arranged were that the District Council should pay the Company £120 per annum in half-yearly instalments of £60; should charge and collect from the occupiers the water-rates authorized by the Company's Act; and, if these exceeded £60 in any half year, should pay over the surplus to the Company. As a matter of fact, the rates collected had never reached the minimum of £60. After some time, it was further arranged that, for the sake of convenience, the Company should collect the rates; furnishing the plaintiffs half yearly with an account of the amount received, when the latter paid over the sum required to make up the £60. The question at issue arose in this way: The Company, between June 1, 1903, and March 31, 1905, collected from a small-pox hospital, which was said to be some distance from the village of Bagnall, and received patients from a considerable area, £27 5s., but had not accounted for this sum to the plaintiffs—claiming that the supply was not for domestic purposes, and therefore did not come within the agreement. The County Court Judge held that it did; and hence the appeal.

Mr. MACMORRAN and Mr. BROUGH appeared for the appellants; Mr. J. B. MATTHEWS represented the respondents.

Mr. MACMORRAN, having stated the facts as set forth above, read from section 45 of the Company's Act of 1853, which gave the scale of charges for water for "domestic purposes or use." Section 47 provided for the supply to schools, manufacturers, dyers, brewers, innkeepers, or other persons requiring water for other purposes than his or their own families' consumption, or to persons requiring water for baths, ponds, washing carriages, or any trade or business, and directed that such supply should be by meter, at certain rates per 1000 gallons. Section 48 provided for the supply for other than domestic purposes, on such terms as might be agreed. When the hospital in question was established, an arrangement was made with the authorities under which they were to pay 20s. per patient, which was thought a reasonable amount—there being naturally a large quantity of water required in such an institution; and had they paid according to the rateable value, the total charge would have been only £10 instead of about £27 per annum. The Council said the Company ought to bring into account the £27 received from the hospital; but the Company contended that, by the terms of the agreement, they were not entitled to bring it in, because the water was not supplied for domestic use at all. [Counsel then read the agreement, the principal portion of which has been stated.] Clause 6 ran: "The said Authority shall not, except on payment of additional rates, permit or suffer the water to be used for any other than strictly domestic purposes; and in case the water shall be required for other purposes, the Authority shall, before using the same, agree to pay to the Company (in addition to the rates herein provided), for all water supplied or used for other than domestic purposes, such further rates as may from time to time be agreed upon." Counsel said the real point in dispute was whether the supply to the hospital came within the purview of the agreement.

Justice RIDLEY asked what the hospital had to do with the village.

Mr. MACMORRAN said, as a matter of fact, this point was not taken before the County Court Judge. The hospital was not within the village.

Mr. MATTHEWS said the hospital was treated as being within the village; and, for the present purpose, he submitted that it must be taken as being so.

Justice RIDLEY said the agreement only had reference to the village of Bagnall. If the hospital was not within the village, the agreement had nothing to do with it.

Mr. MACMORRAN said when the case came before the County Court Judge, the only matter argued was whether the supply to the hospital was wholly or only in part one for domestic purposes; because the Company were quite willing to give credit to the Council in so far as the supply could be said to be for these purposes. His Honour, after hearing arguments on both sides, asked for certain particulars, with which he (Mr. Macmorran) need not trouble their Lordships now; and, to the surprise of both sides, he gave judgment to the effect that, under the agreement, the Company were bound to give credit for all sums received for water, and not for those received merely for that supplied for domestic purposes only. The question really came to this—whether, having regard to the provisions of the Company's Act, the supply to a hospital could be said to be one for domestic purposes. The hospital in question treated patients drawn from a considerable area; and the authorities of the hospital received payment for them. His first proposition would be that the carrying on of a hospital was of the nature of a business. He did not think this would be disputed; indeed, it had been decided long ago that a hospital was a trade or business, not merely within the meaning of covenants but also of statutes. Having cited the case of the *Withington Local Board v. Corporation of Manchester*, decided by Mr. Justice Chitty in 1893 (L.R. 2, Ch. Div. 19), in support of his statement, Counsel said section 47 of the Company's Act made it abundantly clear that a distinction was to be drawn between a supply of water for domestic purposes and one for non-domestic purposes. His submission was that the agreement entered into between the parties was intended to apply only to a domestic supply. In the first place, the supply to the hospital was not what in law would be regarded as a service of water for domestic purposes; and, secondly, it was not within section 47 at all. Counsel then cited the decision of Mr. Justice Buckley in the case of the *South-West Suburban Water Company v. Guardians of the Poor of St. Marylebone*,* to the effect that, in dealing with the question of a supply of water for domestic purposes, one had to look, not at the nature of the building which was supplied, but at the purpose for which the water when received into it was used; and therefore there might, even in an institution of that kind, be a supply for domestic purposes. It had already been held that a supply to a warehouse would be a supply for domestic purposes; and therefore he said he had to look at the objects for which the water was supplied and used in order to see whether or not the service was a domestic one. He went carefully through the whole of the case, and pointed out that some of the purposes for which the water was used were domestic; while others were not domestic. Having referred to the decision when the case was before the Lower Court, the Water Company certainly—and he believed he was right in saying the other side also—were under the impression that the learned Judge might do something of the same kind, and say that, in his opinion, some of the water might be for domestic purposes and some not, and might make an apportionment.

Justice DARLING said, supposing a person in one of the houses in Bagnall entitled to be supplied with water for domestic purposes contracted small-pox, and was treated in his own house, it might be said that, although one might have to wash him oftener, give him more baths, and wash his clothes more when he was ill than when he was well, still he was in his own house, and this would be a use of water for domestic purposes. But if one made a business of bringing people from other places and congregating them together, then the water used on their behalf for washing was not used for a domestic purpose.

Mr. MACMORRAN said his Lordship had touched what seemed to him to be the very spot in the case. The washing of one's own linen at home would be a use of water for a domestic purpose; but if a number of persons sent their linen to a laundry, where the same thing was done, the supply to the laundry was not for a domestic purpose. This was just the distinction he desired to draw. The learned Counsel then read the judgment of the County Court Judge, in which, after reading clause 6 of the agreement, he said it was admitted that the rates paid for water for any purpose in each half year never approached £60; and it must be taken that the defendants had agreed to pay for this water at a non-domestic rate. There must be judgment for the plaintiffs for the amount claimed. This, said Counsel, would lead to the most extraordinary result. Suppose, instead of a hospital, there were a factory or a brewery which required a considerable amount of water, and it was paying £60 a year to the Company under an agreement, this agreement would fail altogether, and the Rural District would never have to pay anything for the water supplied to the consumers in Bagnall. He submitted that this could not be so—that the true construction was that the £60 was to be reduced by the amount received from persons who paid for the domestic supply and for that alone; and that, in the circumstances of this action, the hospital did not come within this description. It was really a supply for a trade or business. It was distinguished in the Company's own Act as being something different from a domestic supply.

Mr. MATTHEWS, for the respondents, said it was agreed on both sides that if this case was to be argued before their Lordships they might leave out of consideration the judgment of the Court below, which had been given in despite of himself as well as of the defendants. It was a very remarkable position. Both parties presented this issue to be decided by the County Court Judge: Was the water supplied to the hospital for domestic or for non-domestic purposes? and such evidence as the parties chose to lay before him was limited entirely to this question. The learned Judge reserved his judgment. But he did not decide that question, saying it was not one to be decided, but went off to another. He said he did not care whether the water was for domestic or non-domestic purposes, for, inasmuch as the rates for one or both purposes did not come to more than the minimum guaranteed by the Council, they must be accounted for. After the judgment was given, the plaintiffs wrote to the Company and said they did not propose to put it into operation to the full extent to which it went.

Justice DARLING: It comes to this, that the judgment is wrong.

Mr. MATTHEWS said he did not propose to support it—he could not do so. There was no suggestion that all the evidence that was considered material on either side was not laid before the Court, and appeared on the Judge's notes; and he should invite their Lordships, on this material, to give judgment on the question which of the items was or was not water supplied for domestic purposes within the agreement. There were four items mentioned in the evidence: "(1) Water used for patients and inmates; (2) washing and ambulance; (3) cleaning the wards; (4) small laundry." He should be thankful if their Lordships would examine the evidence, and give a decision as to these items.

Justice RIDLEY said he did not see how they could go over the items, even supposing they had a right to do so, because, as he understood, the charge was made in a lump sum—so much per patient. Even if they were to say that the last item—the laundry—or some other, might be a non-domestic purpose, how were they going to say what should be deducted?

Mr. MATTHEWS said, of course, the case would have to go back to the County Court Judge to say how much of the £27 was attributable to each of the items. But if they could have their Lordships' judgment to say which item was domestic and which was not, it would be of great assistance.

Justice DARLING said he did not think their judgment was needed. In the judgment of Mr. Justice Buckley in the South-West Suburban Company's case, Counsel would find practically everything they could say, even as to the question of the laundry. Mr. Justice Buckley said a small portion of it might be educational, and not domestic; and so it might be that washing a patient for a medical purpose would not be a domestic but a remedial use of water.

Mr. MATTHEWS said he was quite prepared, if their Lordships were in a position to hear the case, to argue the question whether or not

* See "JOURNAL," Vol LXXXV., p. 636.

these items were domestic, and then let the matter go back to the County Court Judge for him to say how much money was to be attributable to each item. He was quite prepared to contend on the authorities, that all the purposes mentioned were domestic, and that the hospital was entitled to have them. He did not accept the position in which his learned friend ingeniously endeavoured to put him, that it was only a question of apportionment. He submitted that he was entitled to have it all. It might be, however, that he should fail to satisfy the Court to the full extent, and then it would be a question of apportionment; and this would have to go back to the County Court Judge.

Justice DARLING said in any case the judgment could not stand.

Mr. MATTHEWS: No.

Justice RIDLEY said he did not think they could have the pleasure of hearing the question argued by Mr. Matthews. It was quite clear the judgment was wrong; and therefore it must be reversed. If Mr. Matthews wished to go before the County Court Judge and contend that any part of the water supply to the hospital was used for domestic purposes, the question was whether he ought to have liberty to do so. The difficulty was that he could not separate it, because the whole had been treated on the non-domestic basis, and charged for at 20s. per patient; and he did not see how anyone, except by agreement, could arrive at any conclusion on this. Then there was another point behind—that the hospital was not in the village.

Mr. MATTHEWS said this point was never taken before the County Court Judge. He submitted that he was entitled to a new trial, and to have a decision.

Justice RIDLEY: You have had it; but it is wrong.

Mr. MATTHEWS said, with all respect, he had not got it. The real point had never been decided; and it was admitted on both sides that this was so. As their Lordships would not decide it, it must be decided by the County Court whether this hospital supply was wholly domestic or wholly non-domestic, or partly one and partly the other. If the latter, he would have to go into questions of apportionment; but he was quite prepared to argue that the supply was wholly for domestic purposes within the meaning of the authorities. The only other question seemed to him to be the costs; and he should submit that the costs of the first trial and of the appeal should abide the result of the second trial.

After some further discussion,

Justice RIDLEY said the Court were of opinion that this judgment must be set aside; indeed, this followed from the course of the argument in which Mr. Matthews very straightforwardly said he could not maintain it as it was delivered. He (Justice Ridley) thought something must have occurred in the interval during which the learned Judge was considering his judgment, which obscured his recollection of the point that was intended to be raised before him; and in consequence his decision was not satisfactory. He did not propose to go at any length into the definition of non-domestic purposes; and would merely say that, in deciding this question whether any of the water used in the hospital was for purely domestic purposes, he thought the case of the *Withington Local Board v. Corporation of Manchester* and the *South-West Suburban Water Company v. Marylebone Guardians* ought to be considered by the learned Judge in coming to any decision on the matter. With regard to the point on which it appeared his judgment went, he (Justice Ridley) was quite unable to read clause 6 of the agreement in the way the learned Judge did. He did not think it had the operation he stated. He thought it merely meant that, after having indicated what the terms of the agreement with the Local Authority were to be in the first five, the sixth clause was added in order to prevent the Authority from using any water for other than domestic purposes under the terms of the agreement; and it said that if they did so there was to be a further agreement between the parties, and the additional rates for such water were to be from time to time agreed. This being so, the point not having been determined by the County Court Judge, Mr. Matthews was probably within his rights in asking, and certainly it was desirable, that there should be an inquiry whether any portion of the water supplied to the hospital did properly come within the definition of domestic purposes, in which case there might be a right on the part of the Local Authority to say that this must be accounted for. But the Court could not deal with this question—in fact, there would be considerable difficulty about it in any case, as the charge had been made on the hospital by the Water Company at a certain rate per patient. However, this was a difficulty the plaintiffs would have to meet. If it was desired to have the case re-heard, therefore it would be proper that it should be done by the County Court Judge; but the costs of the appeal must be paid by the respondents, because Mr. Macmorran had succeeded. The costs of the first trial would abide the result of the second; and as to the second, of course they would be dealt with by the County Court Judge.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

(*Before the* LORD CHIEF JUSTICE *and Justices* RIDLEY *and* DARLING.)

Thursday, March 1.

Lamberth v. Metropolitan Water Board.

This was an appeal by the defendants from a decision of Judge Smyly, at the Bow County Court, who had given judgment for the plaintiff in an action for damages for injuries sustained by him by reason of the defective condition of the pavement after work had been done by the defendants.

Mr. COURTHOPE MUNRO and Mr. M. WHITE appeared for the appellants; Mr. R. WALLACE, K.C., represented the respondent.

Mr. COURTHOPE MUNRO, in opening the case, said that when anything had to be done to the water-pipes, defendants opened the ground, did what was required, and filled in the earth again; but the reinstatement of the surface was always done by the Local Authority—in this case, the Poplar Borough Council—as they had statutory power to do. Between the filling in by the defendants and the making good by the Council's contractor, the roadway got into a bad condition owing to very heavy rains, and the plaintiff fell and sustained injuries. The County Court Judge found that the defendants were not guilty of any negligence, and that their work was properly done when it was finished on the evening of Jan. 20, 1905; that notice of the road having been temporarily made good was sent in reasonable time on Jan. 21, but was not delivered to the Council in office hours, that day being a Saturday; that the Council received the notice on the 23rd, and forthwith gave instructions to complete the work; that the pathway continued in good condition until after the 23rd; that the plaintiff, on the 24th, fell at the spot where the defendants had done the work; that, from some reason (probably the combined effect of the traffic and the weather), the place had become dangerous, and its condition was the cause of the accident; and that the pavement was permanently made good on the 25th, which he found to be within a reasonable time after receiving the notice. He held that, the road having been opened for the purpose of the defendants' business, they were responsible for its condition on the night of the 24th of January—*i.e.*, until a reasonable time had expired after the notice had been given to the Local Authority. Counsel submitted that the whole question turned on the construction of the statutes dealing with the duties and position of the Council and the Water Board, who now stood in place of the Water Companies. Having cited the various sections bearing upon the subject, he submitted that the defendants' duty was fulfilled when they had reinstated the trench ready for the Council to restore the surface, and that they were not liable for what happened afterwards. In support of his contention, he cited the case of *Hyam v. Webster* (L.R., 4 Q.B.), in which a contractor who had opened a road and reinstated it was held not liable for an accident arising from subsidence some months afterwards. During the argument, it was elicited that the defendants sent a statutory notice to the Council on Dec. 21, 1904, of their intention to begin this work on the 24th, but that it was not, in fact, commenced until Jan. 20; and no evidence with regard to this notice was given in the County Court.

Mr. WALLACE, having pointed out that the case referred to was quite different from the one before the Court—the work of reinstatement there having been completely finished—was not called upon to argue the case further.

The LORD CHIEF JUSTICE, in giving judgment, said the appeal must be dismissed. The defendants opened a trench in the road, and partially reinstated it by filling it up level; but they sent a notice to the Borough Council to complete the work—thereby showing that it was not finished. Apart from any statute, they would, of course, have been liable for any damage arising. But it was said that because the Local Authority had power to do the last part of the work, it must be assumed that the defendants had the protection of the statute. But if they claimed statutory protection, they must fulfil the conditions, which included giving such a notice as would enable the other person concerned to know when it was necessary for the safety of the public that he should be there to finish the work; and no evidence had been adduced that such notice was given. The case of *Hyam v. Webster* was relied upon to show that there was no liability on the defendants after reinstatement. But this meant after complete reinstatement; and under section 111 of the Act the defendants had a certain duty towards the work until this had taken place. If, therefore, the defendants relied on the statute, they failed because they had not fulfilled the conditions imposed; and if they relied on the last part of the work being done by somebody else, they were also liable, because they had not reinstated the road in accordance with the section, had not given reasonable notice to the person liable to do the work, and had not watched the road until that person came and did it. The judgment of the Court below was, therefore, quite correct. He should add that this decision had no bearing whatever on what might be the rights of parties where proper notice had been given under the statute.

The other learned Judges concurred; and the appeal was dismissed, with costs.

Mr. WHITE asked leave to appeal; but it was refused.

The Discharge from the Portsea Island Gas-Works.

In the Chancery Division of the High Court of Justice last Friday, before Mr. Justice Swinfen Eady, Mr. Danckwerts, K.C., moved, in the case of *Broadway and Another v. Portsea Island Gas Company*, for an extension of time for the defendants to complete certain works they had undertaken to carry out. He reminded his Lordship that an interlocutory injunction was granted on the 9th ult. to restrain the defendants from allowing washings from the gas-works to go into certain meadows and streams. But it was suspended for four weeks, which time expired that day. When the motion was heard, the defendants asked for six weeks; but the plaintiffs objected, and only four weeks were given. On that occasion, his Lordship stated that any application which might become necessary on the defendants' part for an extension of time must be made on evidence, showing what had been done, and what remained. He had an affidavit showing what the position of affairs actually was. His Lordship asked if the motion was opposed. Mr. Eve, K.C., who appeared for plaintiffs, said he did not think, in the face of the statement (which he had read), he could oppose the motion, as no evidence had been put in to the contrary. The defendants stated that the works would be completed in a fortnight; and he gave his friend fair warning that he should oppose any further extension. Subject, however, to his getting the costs of this application, he would concede the extra fortnight. Mr. Danckwerts submitted that he ought not to be visited with the costs of the motion, as defendants had written plaintiffs asking for ten days' further time, which was refused. His Lordship said he thought the plaintiffs were entitled to the costs of the motion in any event.

New Export Incandescent Lighting Company.

At the Board of Trade Offices, Carey Street, last Tuesday, the statutory meetings of creditors and shareholders under the winding-up

order made against the New Export Incandescent Lighting Company, Limited, were held. The Official Receiver reported that the Company was incorporated in July 1901, with a nominal capital of £500, in shares of £1 each. The promoter of the Company was Mr. L. S. Liebermann, who stated that he turned his business into a Company with the view of raising more capital to finance the concern. He had acted as a sole Director throughout the Company's existence. No prospectus was issued. In May last, a fire occurred on the Company's premises; and Mr. Liebermann, in whose name the insurance policy stood, made a claim for £759 against the Insurance Company. This claim was eventually settled by arbitration; and it was held that Mr. Liebermann was not entitled to recover any sum whatever. Two debentures for £400 and £300 were issued in November of last year to Mrs. Liebermann and the Solicitor acting for Mr. Liebermann and the Company. They covered the whole of the assets and undertaking of the Company; and it would be the duty of the Liquidator to consider their validity. No proper books of account had been kept; and no balance-sheet nor trading-account had been prepared. No record had been kept of the stock. On Dec. 15, a resolution for voluntary liquidation was passed, and Mr. O. Berry was appointed Receiver on behalf of the debenture-holders. A statement of affairs had been furnished, showing unsecured liabilities £2475, loans on debenture bonds £475, and estimated assets £224. With regard to the shareholders, a total deficiency of £2966 was disclosed. In reply to the Chairman, Mr. Liebermann stated that he could not say when he first became aware that the Company was insolvent.. It was resolved at the creditors' meeting to leave the liquidation in the Official Receiver's hands. The shareholders' meeting, in the absence of a quorum, was formally adjourned.

Lamp Smashing as a Sport.

That the wilful damaging of public lamps, which is such a serious item in many places, is generally indulged in by street urchins, may be a fact; but that they are not the only offenders in this respect was proved by a case heard at the Woodbridge Sessions, in which the Felixstowe Gas Company summoned two army students—Reginald Paget and Ralph Ruck-Keene—for causing injury to their property in this way to the extent of 10s. Mr. F. Paternoster, the Manager, said the Company had suffered to a great extent lately through damage to lamps; and he had every reason to believe it was committed by young army students in residence at Felixstowe. The defendants—who were very strongly suspected of having included in their "fun" the pulling up of a signpost—pleaded guilty to breaking the lamps in question; and they were addressed by the Chairman of the Bench in terms which must have made them feel heartily ashamed of themselves. He said that when he saw their names on the charge-sheet before entering the Court, he was greatly surprised. Both names were very well known in England, and were names that ought never to have appeared on a police charge-sheet under such circumstances. He hoped it was the last time they would allow themselves to come before the Magistrates, and that they would take a warning. The fine would be 21s., with 5s. damage, and 19s. 11d. costs each, or seven days' imprisonment without hard labour.

An Indianapolis Gas Experiment.

Under the above heading, the "Montreal Daily Star" recently contained the following remarks: "Indianapolis has just now an interesting experiment on foot for the gas supply of the city. The Consumers' Gas Company, which supplied natural gas, has a franchise in the city; but when the supply of natural gas failed, the Company was embarrassed. The City Council of Indianapolis wished to buy out the Company; but, as in the case of so many cities, the money was not at hand. Under these conditions, the city put up an option of $100, and caused a Company to be formed, under the name of the Citizens' Gas Company, with a restriction in its Charter that it must not, under any conditions, charge more than 60 c. per 1000 feet of gas. The Directors of the Consumers' Company were glad enough to sell. But a large number of shareholders opposed the transaction; and the trial Judge before whom an application was made for an injunction granted the petition. Mr. Justice Seaman, in the United States Circuit Court of Appeals, however, has just handed down a judgment dissolving the injunction; so that the city may make the transfer to the Citizens' Gas Company. The question that remains to be solved is whether capital will undertake to supply gas at 60 c. per 1000 cubic feet. The new Company is based largely on sentiment; and whether the necessary capital can be secured is doubtful. One provision of the Charter is that would-be consumers, living at certain fixed distances from the mains of the former Company, will have to pay the cost of extending the pipes to their residences; but they will be allotted stock in the Company to the extent of the expenditure incurred. The experiment of securing to a Company, through an option and a restriction in Charter, the right to supply gas, will be watched by many cities situated similarly to Indianapolis."

Gas Poisoning Case at Hereford.—An inquest was held last Thursday on the body of a cook named Mary Weager, who was in the employ of a Hereford gentleman. Deceased, who slept by herself, retired on Tuesday night apparently in her usual health; and as there was no sound of her moving next morning, the room was forcibly entered by the parlourmaid. There was a strong smell of gas; and when the parlourmaid had turned off the tap and opened the windows, she found Weager in bed dead. Dr. Paul Chapman said that the deceased had been dead for about six hours; the cause being coal-gas poisoning. He examined all the fittings, but found no leakage. The parlourmaid was under the impression that the gas-jet was alight when she went into the room; but it was thought she might have been mistaken in her excitement. A verdict was returned in accordance with the medical evidence.

MISCELLANEOUS NEWS.

THE BOILER EXPLOSION AT LONGRIDGE GAS-WORKS.

Board of Trade Inquiry.

The boiler explosion which took place in September at the Longridge Gas-Works—and by which, as was recorded in the "JOURNAL" at the time (Vol. XCII., p. 50), two men named Bamber and Ormerod were killed, while Mr. H. Lancaster, the Manager, was seriously injured—was the subject of a Board of Trade inquiry extending over several days of last week. The Commissioners were Mr. F. S. Williams and Mr. G. Fullerton Bell. The Board of Trade, the Gas Company, and Mr. Lancaster were all legally represented; while Mr. H. B. Green, formerly Consulting Engineer to the Company, appeared on his own behalf.

The boiler in question, which was purchased second-hand in 1899, was used as an evaporator in connection with the manufacture of sulphate of ammonia. From it was a vapour pipe to the saturator; and also fixed on it was a tell-tale pipe, to which was fitted a screwed plug. This pipe indicated any excess of pressure in the boiler. The liquor, which was collected in a tank, was allowed to run by gravitation into the boiler; and the furnace was kept burning until the temperature of the liquor reached boiling-point. The vapour given off passed by the outlet-pipe into the saturator. When nearly all the liquor had been evaporated, the residue was run out by a drain-pipe at the back end of the boiler. At the time when a man named Samuel Smith looked after the plant (about three years ago) he used to leave the tell-tale pipe open at the top whenever the evaporator was at work, and afterwards he screwed the plug in to keep the boiler from corroding; and this plug had not been removed when the boiler exploded. In the course of the inquiry, Mr. Green, who resigned his position in 1902, said the tell-tale acted both as a pressure-gauge and a safety-valve. He described the mountings, and said the tell-tale pipe supplied their deficiencies. It was the custom to dip into the pipe to ascertain the depth of the liquor in the boiler. Mr. Albert E. Laslett, Engineer to the Board of Trade, said he found the vapour-pipe choked at the bend with crystals of sulphate of ammonia; and the tell-tale pipe had not had the plug removed. The front end of the boiler was a very weak formation indeed. As a tell-tale, the pipe was efficient; but as a safety appliance, it was not large enough. Mr. Lancaster, who remarked that he had worked a sulphate plant at Carnforth, said he was twice blinded for several days when working the plant at Longridge. Several alterations were made as to waste gases, but not to the boiler, with regard to which he had no complaint to make. He had not contemplated the vapour-pipe becoming choked with crystals; and he never knew what the tell-tale pipe was for.

In giving judgment, Mr. Williams, the Presiding Commissioner, said they thought that the boiler was not fitted with proper and sufficient mountings. The tell-tale pipe, as a tell-tale pipe, was efficient when unplugged; but as a safety-pipe it was not large enough in diameter to prevent a rapid accumulation of pressure, even if it had been a 1-inch instead of a ¾-inch pipe. There was also the danger of the internal part being broken off—which, in fact, happened. There ought to have been a pressure-gauge of some kind. They thought it was idle to attempt to differentiate this boiler, in which steam was, in fact, generated, from a steam-boiler; and great harm would be done if boilers forming part of the plant for the manufacture of sulphate of ammonia were allowed to be managed by unqualified persons, or were supposed to be in order without the necessary mountings and sufficient internal stays. This was a matter of considerable importance; and it should be generally known. They found that the proper method of working the boiler and sulphate plant was not explained to Mr. Lancaster; but they regretted that they could not exonerate him from blame for the explosion. He undertook the management of the boiler, for which he was not qualified, in addition to the many duties of Manager and Secretary, for which he was well qualified. He was not, however, an engineer, and never contemplated any danger from over-pressure in the boiler. He allowed the tell-tale pipe to remain plugged up. He did not know, and did not inquire, what it was for. He never contemplated that the vapour-pipe might get choked up with crystals. But, apart from the boiler, he worked well and hard, according to his lights. He faced the danger when it appeared; and he was severely injured by the explosion. He had their complete sympathy; but they could not hold him free from blame for the explosion. Dealing with the question as to whether the management of the boiler was entrusted by the Company to competent persons, the Commissioners thought that, during the time Mr. Green was with the Company, this was the case; but after he left, and after the man Smith left, they did not think it was. In their judgment, the explosion was not caused by the conduct of Mr. Green; but they did not think he should have fixed up the boiler in its then condition without stays at the front end, without a manhole, and without mountings, other than the tell-tale pipe. They thought the Gas Company were clearly liable in law for the neglect of any of their servants acting within the scope of their employment. The Company failed to take any proper measures to ensure that the boiler was worked under safe conditions after Mr. Green and Mr. Smith left. The boiler itself was inefficient, with a tell-tale pipe plugged up and corroded, and the internal end broken off. They considered that the Company failed from time to time to employ competent men to work the boiler. The management of the boiler at the time of the accident was improperly left to the Manager and Secretary, who was not qualified for it. He was also short-handed, and overworked with secretarial and other duties. The Company failed to have any periodical inspection of the boiler or its connections; and it appeared that the 1-inch tell-tale pipe, as originally fitted by Mr. Green, disappeared, and a ¾-inch pipe was substituted. When, why, and by whom this was done, had not transpired. For a long time the plant was left to look after itself; and in the opinion of the Commissioners,

the Company were guilty of negligence, and had caused the expense of the investigation.

The Board of Trade Solicitor pointed out that it was for the Commissioners to consider whether the Company should bear the whole or a part of the expenses which they had occasioned. The statute left the question entirely in their hands. Mr. Williams replied that this question had been considered; and they thought the Company should pay £50 towards the cost of the investigation.

CHEAPER, MORE HYGIENIC, AND EFFICIENT GAS.

By Dr. J. Sidney Turner, J.P., M.R.C.S., F.L.S.

[Extract from an Article published in the "Norwood News."]

At the last meeting of the Penge Urban District Council, it was determined by them to act in concert with other bodies in opposition to the new Bill to be introduced into Parliament by the South Suburban Company, whereby they seek to obtain authority for the lowering of the standard of illumination of gas supplied in this district from 15 to 13 candle power.

Now, at first sight, this would seem to be detrimental to the interests of gas consumers, even though the price was, at the same time, reduced. Many who have not studied the subject would say they did not want a cheap gas, but one of high illuminating power, such as was formerly supplied when cannel coal was used to enrich the light. Those persons have not taken into consideration the modern improvements, which are now being almost universally used to produce the most efficient and powerful light, obtained by the use of incandescent media, such as the Welsbach mantle and other inventions have given us. Gas was in its early years simply used as an illuminant; now it is recognized as a force which can produce light, heat, or motive power at the will of the user. For lighting purposes, nothing can excel the incandescent mantle, which greatly increases the illuminating power of the gas, is an immense saving in cost, is more hygienic, and is much cleaner in use than any other mode of gas lighting.

The first two of these advantages are so widely recognized that there is no reason to emphasize them; that it is more hygienic and much cleaner in use—perhaps I cannot do better than quote the greatest living authority upon hygiene. Dr. Louis Parkes (in "Hygiene and Public Health," last edition, 1902, pp. 312-13) says: "The Welsbach incandescent gas-burner is a recent invention, which promises to have a very extended use. . . . The illuminant power is very high for the gas consumed, and the heat given off is far less than an ordinary gas-flame burning the same amount of gas. If such burners came into general use, a cheap form of gas containing no illuminants could be supplied, for heat and not light is required in the flame. The cheap gas would also lead to a more general adoption of gas heating and gas cooking, and to the partial solution of the smoke question." Possibly exception may be taken to the statement that "the heat given off is far less than with an ordinary gas-flame burning the same amount of gas." There can be no question, however, that the amount of heat is far less than of an ordinary gas-flame producing the same amount of light.

It is the hygienic aspect of the question which I wish to emphasize. When gas is imperfectly burned, as it is by the flat-flame—especially under increase of pressure—a large amount of the gas passes off into the air unconsumed. This can be easily demonstrated by collecting the products of combustion in a receiver and applying a light to a pipe connected thereto, when the gas products will re-light. This unconsumed gas is very deleterious to health, and such effect can easily be avoided by utilizing the heating power of gas to produce incandescence, as in the Welsbach burner. The products of gas combustion are: Nitrogen 67 per cent., water 16 per cent., carbonic acid 7 per cent., carbonic oxide, variable—least when combustion is most perfect—sulphurous acid, and ammonia. Now, it is the carbonic oxide which is the most deadly of all the products; and therefore our aim in gas illumination should be to get the most perfect combustion. As we require heat rather than light in the gas of the future, it follows that a 13-candle power gas will not only be less costly, but will give us great heat, and therefore, by incandescence, increased light.

Surely, then, it is not for the public to oppose what are undoubtedly their own interests in this question—viz., to obtain more light and heat at less cost, and also to improve the hygiene as well as the cleanliness of their homes. Thus far I have only spoken of the uses of gas as an illuminant. The advantage of gas as a heating power in cooking-stoves is so well known that it hardly needs mention. Gas cooking-stoves are very cleanly, always ready, can be regulated with great nicety, produce no soot, dust, ashes, or dirt, can be used in summer, and so save the use of a kitchen fire. As they can be immediately put out when the cooking is done, the house can be kept more comfortable and cooler. The modern gas-stove for sitting rooms has also great advantages; the important thing being to have good ventilation. Gas as a motive power is much on the increase. The gas of the future, therefore, will be that which can be cheaply produced and give the greatest heat for incandescent lighting, cooking, and heating stoves, and motive power. Are we not blinding our eyes to the fact that our own interests will be better served by a 13 than by a 15 candle power gas?

The Bingley Urban District Council have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for a new retort-bench, consisting of eight settings of eight retorts each, on Waddell's patent regenerator system, complete with Toogood's patent charging-machine, and Dempster and Mitton's patent discharging-machine. Previous to placing the order, the Gas Committee paid a visit to the Falkirk Gas-Works, where they saw the machines, and also the settings, in operation. The contract, which has to be completed by August, includes coal breakers, elevators, overhead hoppers, and conveyors, as well as electric generating plant, motors, &c.

PROVINCIAL GAS AND WATER COMPANIES.

Draycott Gas Company and their Neighbours.

At the annual meeting of the Draycott Gas Company last Tuesday, the Chairman (Mr. J. N. Derbyshire) was in a position, when moving the adoption of the report, to congratulate the shareholders on the excellent results of the past year's working. He said the profit available for distribution was £1497; and after paying the preference dividend and the Directors' fees, and placing £234 to the reserve fund (bringing it up to £650), the Company were able to pay a dividend of 7 per cent. on the ordinary shares, and carry forward £58. He gave some interesting figures showing the progress made in the past ten years—the sale of gas having increased from 1½ to 23 million cubic feet, or upwards of 1500 per cent. The price charged originally was 4s. 6d. per 1000 cubic feet. The average for last year was 2s. 6d.; and he announced that the Board had decided to reduce the price a further 2d. at the close of the present quarter, which would bring the average to about 2s. 4d. This he believed to be the lowest price charged by any company of similar size in the district. He pointed out that these results had been obtained by persistent effort on the part of the management. The largest increases in consumption had been obtained through gas-engines. With these the Company had been very successful—in fact, he thought he was right in saying that during the whole of the ten years not a single new steam plant had been installed in the three parishes supplied by the Company, while the number of new gas-engines had been no less than 23. At the present time, the Company were supplying power for flour milling, joinery works, a brewery, cotton doubling, lace manufacturing, engineering, sewage and water pumping, and electric lighting. In order to encourage the use of gas as a motive power, a very low scale had been adopted—large consumers being only charged 1s. 6d. per 1000 cubic feet. The Chairman said there was another matter he should like to mention, and it had reference to the Derby Gas Company. That Company two years ago promoted a Bill to obtain power to extend their supply to Shardlow, which for a number of years had been served by the Draycott Company. Protests were made to the Directors, and urgent requests were made to them to withdraw this part of their Bill, but without success. It was only after petitioning Parliament and incurring considerable legal expense that the Derby people withdrew. The same Company were promoting a Bill in the present session to extend their area to a point which encroached on the district supplied by the Draycott Company. Protests had again been made, but again without any success; and it had become necessary to petition against the measure. It was intended to strenuously oppose the Bill. The Derby Company had a large lucrative area with which he thought they should be content, instead of seeking to encroach on a small straggling district which Parliament had allotted to others. It was most unfair that a small Gas Company should have to be constantly petitioning Parliament in order merely to protect themselves from a powerful competitor. In conclusion, he stated that the satisfactory results obtained had been largely owing to the untiring energy and zeal of the Works Manager (Mr. J. G. Salmon) and the Works Director (Mr. Joseph Reeds), to whom the thanks of the Company were due. The report was unanimously adopted.

Increased Sale of Gas at Enfield.

At the half-yearly meeting of the Enfield Gas Company on Tuesday, the 27th ult., Colonel Sir Alfred Somerset, K.C.B., the Chairman, in moving the adoption of the report and balance-sheet, said the accounts presented showed that a net profit of £4049 had resulted from the operations of the Company during the half year to December last, and that if the proprietors declared the dividend recommended in the report, £3507 of it would be allocated, and there would be a remainder of £542. They were therefore in the position of having earned in the six months £542 more than was required to pay the preference dividend and one at the rate of 5½ per cent. on the ordinary stock. This surplus would, in the event of the recommendation referred to being acted upon, go to swell the undivided profits, which would then amount to £4069. During the half year, they had laid 2 miles of additional mains; the number of consumers of all classes was increased by 716; and 495 more cookers were fixed for use. The depressed state of trade in the district generally, and the slackness of work at the Small Arms Factory in particular, had affected the sales of gas, so that they found the users of slot meters had each taken, on an average, nearly 9 per cent. less gas than in the corresponding half year; but, in spite of this, and of the continuing displacement of the out-of-date flat-flame burners by one or other of the multitude of incandescent burners now obtainable, the total sales of gas had been increased by nearly 9 per cent. as compared with the second half of the year 1904. Such a result, gained in face of the circumstances he had mentioned, brought into prominence the fact that due attention was paid to the getting of new business. He had mentioned that an additional 2 miles of mains had been laid in the half year. The proprietors would be glad to learn that the number of consumers per mile of main laid had increased also. Six months ago it was 115; now it was 125. They would see that the Directors had spent in the half year £4590 of capital; and that, with the exception of £245, this expenditure had been made for additional mains, services, meters, and cookers. The growth of the business had absorbed all the last issue of capital, and this account was now indebted to the amount of £4096. The Directors had consequently made arrangements for an early issue of further consolidated ordinary stock. Mr. Alfred Ford, in seconding the motion, pointed out that, comparing the accounts with those for the second half of the previous year, 1258 additional tons of coal had been carbonized for an extra cost of £941; while the gas-rental had increased £815—the rate per 1000 cubic feet over the whole half year had been 1d. per 1000 feet less, consequent upon a general reduction to private consumers of 2d. per 1000 cubic feet from October, 1904, and the granting of special reductions for large consumptions. There was a falling off in the returns for coke to the extent of £96—the average sale price being less by 2s. per ton; and the total for residuals was slightly less than last year. The number of consumers had grown by 1488; while the users of gas-cookers had increased by 1311. The motion was unanimously passed,

and dividends at the rates of 5 per cent. on the preference stock, and of 5½ per cent. per annum on the consolidated ordinary stock, were declared. The Directors (Dr. J. Collyer and Mr. F. G. Fitch, J.P.), and the Auditor (Mr. T. Maskall, F.C.A.) retiring by rotation, were re-elected. The Directors were accorded a very cordial vote of thanks; and a like compliment, expressed in most gratifying terms, was accorded to the General Manager and the staff. The votes were acknowledged respectively by the Chairman and Mr. C. W. Offord. In the course of the proceedings, reference was made to the additional capital shortly to be issued; and the proprietors were reminded that when in April last the Directors offered £8000 of consolidated ordinary stock for sale, the applications amounted to £35,820.

Effect of Competition at Ilfracombe.

In the annual report presented at the recent meeting of the Ilfracombe Gas Company, the Directors stated that the total number of customers on the books was 2183—an increase of 92 on the year 1904; while the number of cookers in use was 693, or 62 more. In the Combemartin district, to which the Company have in recent years extended their mains, there was a satisfactory increase; the number of meters fixed up to Dec. 31 last being 172, while there are also 86 cookers in use. The available balance on the year's trading was £3693; and the Directors recommended the declaration of the statutory dividend of 5 per cent. Mention was made in the report of the retirement, owing to ill-health, of Mr. C. E. Ball, from the position of Manager, after 23 years' service, in which he had given unqualified satisfaction. The Directors still retained his services as Secretary, and out of a large number of applicants had appointed as Manager, Mr. James Armstong, the Assistant-Manager at the Long Eaton Gas-Works. Mr. R. M. Rowe pointed out that the consumption of gas had decreased the last year or two. In 1903, the private consumption was 42,940,800 cubic feet; while last year it was only 40,342,500 cubic feet. The same regrettable feature was observable in regard to the public lighting, the consumption for which was 4,361,000 cubic feet in 1903, and last year only 4,212,000 cubic feet. In these three years the receipts had decreased by no less than £513. The Chairman (Mr. R. Lake) pointed out that in the years referred to the Company had had to meet the competition of the electric light, which had deprived them of some of their best hotel customers; while another cause for the decreased consumption was the fact that some of the large houses had been unoccupied during last summer. The incandescent burner, though an advantage to the consumer in giving a better light, was a disadvantage to the Company in regard to the quantity of gas consumed. The effect of this was felt both in the public and private lighting; for though the latter was increased every year, the amount paid to the Company was smaller. They, however, had not suffered such a loss as would deprive them of their dividend of 5 per cent. all round. The report was adopted; and the meeting confirmed a recommendation that Mr. Ball should be appointed Secretary at a salary of £120 per annum,

Further Progress of Gas Supply in North London Suburbs.

In the "JOURNAL" last week, we gave some particulars as to the gas supply during the past half year in the districts served by the North Middlesex and Southgate Gas Companies, and showed how in each case there had been an increased sale. Similar good results attended the working of the Waltham Abbey and Cheshunt Gas Company, which may almost be called a suburban undertaking. According to the report presented by the Directors of the Company at the half-yearly meeting held on the 2nd inst., over which Mr. Alfred Kitt, Assoc.M.Inst.C.E., presided, the quantity of gas sold in the six months ending Dec. 31 last was 5·49 per cent. more than in the corresponding period of 1904; many additional customers having come upon the books as the result of extensions of the mains. The Company had some difficulty with the Local Authority with regard to the effluent from the sulphate plant; but they have adopted the Radcliffe process for treating it, and it is hoped there will be no further trouble. The Chairman stated that a proposal had been before the District Council to purchase the Company's property; but nothing had been officially communicated to the Directors on the subject. Of course, they would not be willing sellers of their undertaking. The profit available for distribution was £3368; and dividends at the rates of 8½ and 6½ per cent. per annum on the different classes of shares—being an increase ½ per cent.—were declared. A sum of £568 was placed to the renewal fund; and £518 is carried forward.

Increased Consumption at Southend.

The Directors of the Southend Gas Company, in their report for the half year ended Dec. 31, stated that there had been a very satisfactory increase in the sale of gas—130,194,000 cubic feet, as against 121,397,300 cubic feet for the corresponding half of the previous year. This was equal to 7·24 per cent. The profit and loss account showed a net amount available for dividend of £8810; and they recommended payment of dividends as follows: On the original and new ordinary stocks, at the rate of 5¾ per cent. per annum; and on the new ordinary "B" stock, 5⅝ per cent. per annum (both less income-tax). These would amount to £5192, leaving £3618 to be carried forward. At the meeting, the Chairman (Mr. C. F. Woosnam) said that during the six months they had added 606 consumers, making the total to Dec. 31 8630. Of these, 3335 were ordinary consumers, and 5295 prepayment. They had fixed 589 cooking-stoves and 226 fires, making the total of cookers and fires on Dec. 31 6046. They had put in 837 services, fitted with fittings 772 houses, and laid neary 2 miles of mains, from 4 inches upwards. This had, of course, caused them to dip into the capital again; and they had to spend under the heads of manufacture, distribution, and new meters and stoves, £11,156. Distribution, he was pleased to say, was the largest item—that was, laying mains, fitting up houses, &c., with a view to increased business in the future. The make of gas per ton was excellent—11,365 cubic feet. The report was adopted; and the Chairman and the Engineer (Mr. F. Clark), the Secretary (Mr. J. T. Randall), and staff were thanked for their services.

New Works and Better Results at Winchester.

The Chairman of the Winchester Water and Gas Company (Mr. Charles Warner) had a pleasant duty to discharge in moving the adoption of the Directors' report at the half-yearly meeting on the 26th ult. This document showed an increase of £567 in the receipts from the sale of water and gas, and of £768 in the total revenue in the latter half of last year, as compared with the corresponding period of 1904. The balance carried to the profit and loss account was £4397—an increase of £1172. The amount available for distribution was £3653; and the Directors recommended the payment of a dividend at the rate of 4 per cent. per annum on the preference and consolidated ordinary stocks. The Chairman pointed out that the increase in the revenue from gas had come from the larger proportion sold, which showed that the mains were in better order and the management more careful. They had sold 42,847,000 cubic feet of gas compared with 40,681,000 cubic feet in the latter half of 1904. There had also been a substantial advance in water-rental—£3631 to £3822. The expenditure on revenue account had been £9191, against £9564; so that they had done more business at less cost. The past was almost the first half year for a long period when they had earned their dividend without entrenching upon the balance brought forward; and they hoped this would be the beginning of prosperity which would justify the erection of the new works at Winnall. They had spent £14,000 odd on capital account; £1640 being for a new reservoir on West Hill and the laying of mains in connection with it. They had expended £952 on the installation of prepayment meters, of which there were upwards of 322 in use in the city. They had found their enterprise was likely to be profitable; for the use of gas for cooking had increased between twelve and one o'clock on Sundays. The report was adopted, and the dividends were declared. A vote of thanks to the Chairman, Directors, and officers having been accorded, on the motion of Mr. W. Barrow Simonds, jun., seconded by Mr. S. W. Durkin, of Southampton, the Chairman, in acknowledging it, pointed out how much the shareholders were indebted to their officers for their work. He said the last two years had been an anxious time for the whole of them in initiating a new departure in the way of new works; and the labour which fell upon the Engineer and General Manager (Mr. H. C. Head, Assoc.M.Inst.C.E.) had enormously increased by the enlargement of the area over which their business was conducted. He considered the whole Company and shareholders were indebted to Mr. Head, not merely for the skill he had displayed, which was a great thing in itself, but for the hard work he had put in for the Company. Mr. Head also returned thanks. He said he spoke as the representative of the whole staff; for whatever he had done would have been unavailing if they too had not done everything they could to further the Company's interest. They had worked excellently, and any increase or good result obtained was largely due to them.

Progress at Worthing.

Addressing the shareholders at the half-yearly meeting, Mr. H. H. Gardner, the Chairman of the Worthing Gas Company, said the capital account showed an overdraft of £3823, so that a further issue of shares would be necessary at an early date. With regard to the revenue account for the past half year, the figures were simple and satisfactory. There was an increased amount paid for coals of £294, and an increased sum received for gas of £545, compared with the same period the previous year. Repairs to works had been reduced by £322—chiefly brought about by the extra expenses incurred in 1904 by the dismantling of the old gasholder and station meter. Repairs to mains were £502 more, representing the renewal of the main from Splash Point to the Burlington Hotel; and it was gratifying to find the revenue equal to this strain. As to income, besides the larger sales of gas, there had been a substantial increase in rentals for meters, stoves, and prepayment fittings; and the net result on the whole undertaking showed a growth in profit of £217. The profit and loss account had had to bear a further charge of £250, to clear the liabilities in connection with the recent application for a new Provisional Order; but in spite of this, they were carrying forward a balance of £8818, instead of £7947, as at the end of last June. The growth of the undertaking exhibited sound and healthy progress; there being an increase of nearly 5 per cent. in the sales of gas. The number of stoves out on hire was 2842; while the number of consumers for the year 1905 was 4560. The Company's financial position was being steadily fortified preparatory to any needs that might possibly arise in connection with future arrangements. So far as the Directors could see, the outlook for gas was as bright as, if not brighter than, ever. They would watch with interest the issue of applications to Parliament for a lower illuminating power, which seemed to be a question as to whether the time had arrived when all gas for lighting should be by the system of incandescent burners. If so, no doubt the gas of lower illuminating power would be capable of being supplied somewhat cheaper. It was also their duty to bear in mind that public lighting by electricity was now generally acknowledged as being very expensive and unsatisfactory; and if the town got tired of this unnecessarily heavy burden, and reverted to gas, they must be prepared in a reasonable time to supply it. No mention had been made in the report as to what was being done in consequence of the Company's failure to obtain the Provisional Order applied for last year. The reason of this was that the matter was still under the consideration of the Board and their expert advisers. It was hoped, however, at no distant date to be able to make some definite announcement. The usual dividends of 10 and 7 per cent. respectively were declared; and votes of thanks were accorded to the Directors, the Engineer (Mr. W. A. Walker), and the other officers of the Company.

The New Holder for Macclesfield.—The Macclesfield Gas Committee, in view of the delay and expense that would be entailed in obtaining a Provisional Order authorizing them to borrow the money for the new gasholder recommended by Mr. W. Newbigging, the Engineer (*ante*, p. 515), have resolved to charge the cost to the maintenance fund; and this the Council have agreed to. It has further been resolved that £1500 of the current year's profits shall be carried to the maintenance fund, and the balance to the district fund.

METROPOLITAN GAS COMPANY OF MELBOURNE.

Unaccounted-for Gas.

The Half-Yearly Meeting of this Company was held at Melbourne on Jan. 26—Mr. JOHN GRICE presiding.

The CHAIRMAN, in moving the adoption of the report and balance-sheet, said the prosperous condition of the State was reflected in the figures of the Company, which last year had made a bigger stride forward than usual. The sales of gas for 1905 amounted to 1268 million cubic feet, as against 1207½ million cubic feet for 1904—representing an increase of 60½ million cubic feet, which was equal to 5 per cent. Leaving out the Brunswick Gas Company's business—which was included for the first time in the figures, and represented 14½ million cubic feet—and the gas which passed through the additional slot meters installed during the year (10 million cubic feet), there was still an increase shown on the ordinary business of 36 million cubic feet. The receipts for gas showed a total increase of £12,670, and residuals an increase of £3241 over the previous year. The coal carbonized was 135,658 tons, as against 131,433 tons in 1904, showing increased returns from gas and residuals of £15,911; while the increased consumption of coal amounted to but 4225 tons, costing, with purifying material, labour, and sundries at works, only an additional price of £2639. This was one of the best features of the report, as it showed most gratifying results from the newer machinery and more improved methods of carbonization, and justified the very large expenditure which had from time to time been made. These results could not have been obtained if a large amount for reserve fund had not been set aside each year, and expended for the purposes named. With regard to residuals, there had been such a brisk demand for coke that during the greater part of the year it had been delivered almost as soon as it was made. The quantity of tar in stock had been considerably reduced, and stood now at only 311,000 gallons, as against 403,000 gallons in 1904, and 536,000 gallons in 1903. The lowering of the price of power gas from 4s. to 3s. per 1000 cubic feet, referred to at the July meeting, resulted in an increased output. The number of meters standing fixed showed a considerable increase. The Company were continuing to put out slots at the rate of about forty per week; and though the returns had been so far up to expectations, the Directors would like a more extended experience of them in greater numbers before largely increasing the rate at which they were issued. The stoves on hire and hire-purchase at Dec. 31 numbered 9088, against 8862 at the same date in the previous year. The hire-purchase system, adopted at the end of 1903, had resulted in the disposal of 1002 stoves in the two years. The high-power self-intensifying lamps introduced by the Company had proved most effective as means of lighting public halls, warehouses, hotels, large rooms, and business places generally. The most recent installation of these lamps was in one of the Melbourne theatres; and generally most satisfactory results had attended the Company's efforts to obtain their adoption. The unaccounted-for gas during the year under review, as shown on the two half-yearly balance-sheets, was practically the same as during the preceding twelve months—viz., about 7 per cent. of the total gas made. In proportion to the business done, the mileage of mains—about 800—was very great; and in considering this subject, it was necessary to bear in mind that undertakings at home, selling about the same quantity of gas, had not more than 250 miles of mains, and in some instances only 150 miles. The conditions under which the Company worked were so different to those prevailing in the Old Country, that it was difficult to compare the two. It might, however, be noted that the West Ham Gas Company, who supplied a suburb of London, had a total unaccounted-for gas of 4 7 per cent., the mileage of mains being 240; while Brighton, with 170 miles of main, was unable to account for 6·5 per cent. of the gas manufactured. In London, the unaccounted-for gas of the Metropolitan Companies averages 4·4 per cent. of the gas made; the total number of miles of main being 3530. The average of the Suburban Companies was 6 per cent.; the total miles of mains being 1622. Looked at in another way, they would find that, whereas in Melbourne the gas unaccounted for was about 125,000 cubic feet per mile of main, yet in the case of six undertakings in England—including such places as Portsmouth and Salford, all of which sold about the same amount of gas that the Melbourne Company did—the average quantity of gas unaccounted for was about 400,000 cubic feet per mile of main. In Manchester, where the mileage of mains was about the same as their own, the unaccounted-for gas was 260,000 cubic feet per mile; but their output of gas was nearly four times that in Melbourne. The balance-sheet for the half year showed that "Wages, distribution" was higher than in the corresponding period of the previous year; but this included the wages of inspectors and others dealing with slot meters. "Repairs, distribution" was greater to the extent of £1167, including also extra expenditure for slot-meter installations. He was sure they could not but approve of the disposal of the profits. The increased dividend of 5s., paid for the first time last half year, absorbed £42,860; while £9000 had been placed to the reserve fund. In June, 1904, this fund stood at £87,910; but such heavy demands had been made on it for improvements, new mains and services, and for the purchase of the Brunswick Gas-Works, &c., last December, that, with the £9000 now transferred, it stood at £84,570. Then £2000 had been placed to the credit of the meter renewal fund, and £2500 to gas-stoves account. The case of the Metropolitan Gas Company against the City Council, in regard to the maximum demand system of charging for electricity, was still *sub judice;* the Full Court having found in favour of the Company's contention that such a method of charging was contrary to law. The City Council had given notice of their intention to appeal to the High Court of Australia.

Mr. E. J. WHITE seconded the motion, and said the fact that there was now no correspondence in the Press concerning the Gas Company, proved that the concern was under better management.

The motion was carried.

A dividend at the rate of 5s. per share was declared out of the profit of the half year; and the meeting closed.

AUSTRALIAN GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held at the Royal Exchange, Sydney (N.S.W.), on Jan. 29—Mr. G. J. COHEN, the Chairman, presiding.

The SECRETARY (Mr. R. J. Lukey) having read the advertisement convening the meeting, the report of the Directors was taken as read. This stated that the profits for the half year to Dec. 31, after making provision for bad and doubtful debts, deducting interest on borrowed money, repairs and renewals, depreciation of plant, working expenses, and all other charges, with the balance brought forward, amounted to £69,846. The Directors recommended the payment of a dividend for the six months of 9s. per share on the old shares, and in proportion on the new shares, free of income-tax. This would absorb £59,284, leaving a balance of £10,560 to be carried forward to the next account. The Engineer (Mr. T. J. Bush) reported that the whole of the plant was in good order and condition. Notwithstanding the competition of the electric light, the sale of gas in the city and suburbs was steadily increasing.

The CHAIRMAN, in moving the adoption of the report and accounts, remarked that, when moving the adoption of the Directors' report at the half-yearly meeting in July, he stated that the increase in the consumption of gas was not so great as usual—owing more particularly to the exceedingly mild weather. Since then they had experienced the coolest summer for many years past, resulting in a large increase in consumption, compared with corresponding half years. Taking 1905 as a whole, he was pleased to say that the normal increase in the consumption of gas had been more than fully maintained. Throughout the city where the electric lighting competition was keenest, the consumption of gas was still increasing, notwithstanding that, to a great extent, the public lighting was now carried out by the Municipal Authorities. The great activity at present in the suburban districts was demanding very special attention from the Company. As far as possible, mains were always laid in excess of existing requirements; but it was almost impracticable to estimate local wants. In some instances further provision had had to be made long before it had originally been supposed that this would be necessary; and there were indications that other suburbs, before very long, would require similar attention. There was thus no reason to think that gas had had its day, as far as Sydney and the suburbs were concerned. While it was very pleasing to speak so hopefully of the Company's affairs as regarded income, the expenditure side was not so pleasant. He had at previous meetings touched upon the enormous amount of extra taxation the Company had been called upon to meet of late years. To this had now to be added a further sum of £2000 per annum, representing the second instalment of the increased wages to the workmen, under the award of the Arbitration Court, which came into operation on Jan. 1. These charges prevented for a time the consideration of a reduction in the price of gas. It must not be forgotten that, though the Company were charging 4s. per 1000 cubic feet for gas, with a discount of 20 per cent. for engine purposes, the cost to the consumer was much less than the charge for electricity, taking light for light. That London should have discarded electricity for gas, must have come as a great surprise to those electricians who predicted that gas in a few years would be a "thing of the past." Not only were the older and more familiar streets of the Metropolis now lighted by gas, but also the new streets—Aldwych and Kingsway—opened by His Majesty the King in October last. It was freely admitted that the City of London had never been so well lighted before, and at a considerable reduction in cost to the ratepayers. Following upon the change in the lighting of the streets of London came the news of the adoption of the high-pressure gas system at Buckingham Palace. The effect of this change had been most remarkable, and favourably commented upon by the leading papers of the Old Country. Other cities and towns were now following in the wake of London; and before very long, gas would doubtless again be in the ascendency, as of old. During the Commonwealth Celebrations in 1901, the Company gave an exhibition of high-pressure gas lighting in Wynyard Square, which was highly successful. The Company would have been prepared to light up Hyde Park under similar conditions, had they had the opportunity, at a much less cost than the Council were charging for electricity, and with far better results as regarded illumination than the present system. He was bound to admit that the City Authorities had greatly improved the lighting of Hyde Park; but this was naturally to be expected, when the ratepayers had had to meet an annual charge of £1820, as against £430 received by the Gas Company. The great results from ordinary incandescent gas lighting could be better maintained if the consumers would give more attention to mantles and burners. With this object in view, the Company had undertaken the maintenance of them at a small cost; and he was very pleased to say that the efforts of the Board to assist the consumers in this direction were meeting with much success. The sales of gas-cookers had greatly increased of late; 639 having been disposed of by the Company during the past half year. The total sales to date were 13,500, apart from the sale of other gas-cookers by local agents. These cookers were sold on the instalment system, so that when the value was reached the stove became the property of the purchaser. The number of public lamps supplied by the Company at the end of the year was 10,374, showing a decrease of 19 only. The consumers numbered 69,614, representing an increase of 1599 when compared with the return for the previous half year. Extensions had necessitated the laying of 65 miles of mains and special service-pipes; the total to date being 2012 miles.

The DEPUTY-CHAIRMAN (Mr. J. H. Storey) seconded the motion, which was carried unanimously.

The business of the meeting was concluded with a vote of thanks to the Directors and officers for the efficient services rendered during the half year.

The Directors of the British Gaslight Company, Limited, propose to recommend a dividend at the rate of 10 per cent. per annum for the half year ended Dec. 31, free of income-tax.

HARROW AND STANMORE GAS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held on Monday last week, at the Albion Tavern, Aldersgate Street, E.C.—Mr. A. H. Baynes in the chair.

The Secretary and Engineer (Mr. J. L. Chapman) read the notice calling the meeting; and the Directors' report and the accounts having been taken as read,

The Chairman said he thought the proprietors would regard the report as probably the most satisfactory one the Board had ever presented. It was a record of increased progress and prosperity. He was not going to weary them with many figures; but there were one or two observations he should like to make. The gas-rental for the half year had amounted to £11,151—an increase of £872 in the receipts as compared with the corresponding half of 1904. The price of gas for the quarter ending Michaelmas last was reduced by 2d. per 1000 cubic feet in the outer area, and by 1d. in the inner area; and for the quarter ending at Christmas, by a further 1d. in the outer area. Special discounts for power had also been given during the whole of the six months; and, but for these reductions, the increase of rental would have been £1140, instead of, as it was now, £872. The total make of gas for the half year ending December last was 67,808,000 cubic feet. The coal gas produced was 41,940,000 cubic feet; and 3938 tons of coal were carbonized—giving an average make of 10,650 cubic feet of gas per ton. The quantity of oil gas supplied was 25,868,000 cubic feet; and the oil used 72,862 gallons—yielding 1000 cubic feet of gas for every 2·81 gallons of oil. The total quantity of gas sold was 60,916,000 cubic feet; being an increase on the corresponding period of 1904 of 5,386,000 cubic feet, or nearly 9¾ per cent. Of this increase, the Harrow and Wealdstone district took 9·17 per cent.; the Sudbury and Harrow Weald district, 8·53 per cent.; the Stanmore district, 14·92 per cent.; and the public lighting, 3 70 per cent. The meter and stove rentals amounted to £1029—an increase of £215, or 26 41 per cent. The proprietors would not be surprised to learn that, in common with other gas companies, the low price of coke and other residuals had produced a decrease in their own case of £268, or 15·46 per cent. The total amount of the receipts for the half year was £15,053; the increase having been £1226. The total expenditure was £10,374; the increase on the corresponding half of 1904 being £933. With regard to other changes in the accounts, 135 tons more coal had been carbonized, and 10,475 gallons more oil used; costing an additional £154. Repairs to works exhibited an increase of £166; repairs to mains, one of £460; and repairs to meters, one of £154. The total cost of the alterations to the governors had been £500, half of which sum had been charged to revenue. The cost of the alteration to mains in connection with the governors had been £323; and of this £233 had also been charged to revenue, together with the whole of the cost of the new building to cover the meters, amounting to £208. The sum of £200 had also been written off house services, and £200 off stoves, and £10 had been added to the workmen's insurance fund. The amount of the unaccounted-for gas during the half year was 6,066,000 cubic feet, or 8·95 per cent.; the average for the whole year having been 7·49 per cent. In the half year covered by the accounts, 220 additional slot and 127 additional ordinary services had been installed; the present total number of consumers being 4300—viz., 2300 ordinary, and 2000 automatic. The public lamps numbered 900. The total profit for the half year was £4679—an increase of £293 on the corresponding period of 1904. Interest on mortgages and loans required £555; and the dividend recommended in the report would take £3992—leaving a balance of £131 to be carried to the previous balance of £2701, and giving a total sum of £2833 to be carried forward to next year. He thought, on examining these figures, the proprietors would agree that the Company had had a satisfactory six months. He ought also to refer to the clause in the report which stated: "The Directors have united with other Gas Companies (who, under their different Acts of Parliament, are subject to restrictions with regard to the occurrence of certain sulphur compounds) in the promotion of a Joint Bill for the removal of these restrictions. A Departmental Committee of the Board of Trade recommended their abolition; and on the initiative of the London County Council, effect has been given to their recommendation in the case of the London Companies." The Bill was read the first time some days ago; and the second reading was down for Wednesday. He hoped the measure would be successfully carried through. Concluding his remarks, he moved the adoption of the report and accounts.

The Vice-Chairman (Dr. J. W. Lee Glaisher, F.R.S.) seconded the motion, which was unanimously adopted.

Proposed by the Chairman, and seconded by Mr. A. F. Phillips, a dividend was declared at the rate of £9 15s. per cent. per annum on the original "A" capital, of 7 per cent. on the additional "B" capital, and of £6 16s. 6d. on the additional "C" capital and guaranteed shares, all less income-tax.

Moved by the Chairman, seconded by Mr. Phillips, Dr. Glaisher, one of the retiring Directors, was re-elected; and on a similar motion by the Chairman, seconded by Mr. Samuel Cutler, Mr. Horace J. Rydon was also returned to his seat at the Board.

Mr. T. H. Martin moved the re-appointment of the retiring Auditor (Dr. C. E. Goddard); and, Mr. F. Lennard having seconded, the proposition was agreed to.

There was some discussion on a proposal by Mr. Pilley that the Directors' fees should be increased by 50 guineas, the Auditors' fees by £10, and the Secretary's salary by £25, per half year, as from Jan. 1 last. He mentioned that there had not been an increase in the Directors' fees for about twelve years, since which the revenue had more than doubled, and the dividends on the various classes of capital had risen by £2 5s., £1 11s. 6d., and 16s. 6d. The resolution was seconded by Mr. Barham, who considered the proposed increase in the Directors' fees a very moderate one. This view was shared by Mr. Cutler and Mr. Lennard; and, in the result, the resolution was amended, so as to raise the Directors' fees by £65 in the half year—thus making the total of their fees £550 per annum.

Mr. Phillips, in moving a vote of thanks to the Secretary and Engineer, mentioned that Mr. Chapman had been very busy lately erecting new purifiers; and if he got relief from the sulphur compounds restrictions, the Company would soon be able to pay a dividend of 10 per cent.

The motion was seconded by Mr. A. W. Oke, and unanimously carried.

Mr. Chapman, in his acknowledgment, claimed that the Company's works were second to none in this country. As a point of professional interest, he might just mention that, with one bench of six inclined retorts, 18 feet long, they had made 100 million cubic feet of gas without any repairs. This spoke well for inclined retorts, and for the work they did at Harrow. He added that, in the Public Hall at Harrow, they had had the electric light. Previously the building was fitted up with old-fashioned gas-lights; but the Company were never given an opportunity of improving them. The Public Hall authorities had since come to the Company, and had asked them to fit up the hall on the most approved incandescent-gas system. This had been done; and the hall was now lighted by gas.

An Extraordinary Meeting was then held to consider, and, if thought fit, to pass a resolution sanctioning the creation and issue, under the Company's Acts of 1873 to 1903, of £21,950 debenture stock, bearing interest at the rate of 4 per cent. per annum.

The Chairman said, in a single sentence, he could explain that the object the Directors had in view was the retiring of the mortgage bonds, and exchanging them for perpetual 4 per cent. stock. The Board thought it right that the shareholders who held the Company's mortgage bonds should have an opportunity of changing them for debenture stock. He moved the adoption of the resolution.

Dr. Glaisher seconded the motion.

The Chairman, replying to Mr. Barham, said the holders would get a permanent 4 per cent. now, instead of a short terminable bond.

Mr. James Randall said the bonds had been somewhat of a block to the Board. By the change they were effecting, they were making the stock marketable; and he thought they would find the debenture stock would soon command a premium.

The motion was unanimously adopted; and after the services of the Chairman and Directors had been acknowledged, the proceedings terminated.

CAGLIARI GAS AND WATER COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Tuesday, at the Company's offices, No. 11, Ironmonger Lane, E.C.—Sir John Aird, Bart., in the chair.

The Secretary (Mr. W. B. Peat) read the notice calling the meeting; and the Directors' report and the accounts were taken as read.

The Chairman said he was glad that the statement of accounts the Directors had the pleasure of submitting to the shareholders was again satisfactory; that the works continued, as before, in good order; and that the usual dividend could with confidence be declared, and the amounts as stated in the balance-sheet be carried to reserve and sinking funds. At the same time that this result had been produced for the benefit of the shareholders, he was glad to be able to say that the supply of gas and water in the city of Cagliari and the area served by the works had been continued during the year with satisfaction to all parties, subject to the observation that the demands for water made it necessary in the summer to somewhat limit the supply, which, the Directors hoped and believed was done without inconvenience to the Company's friends, the citizens of Cagliari. He would deal further with the subject of the water supply at a later part of his observations. The question of extending the gas concession had again had the consideration of the Cagliari authorities and of the Board; but as the matter was still in process of adjustment, it was better on this occasion that he should make no further remark, except to say that, as throughout, the Board were very wishful to enter into such arrangements only as might be mutually advantageous. They could not but feel that the Cagliari authorities would recognize the important fact with reference to the gas supply, that the Company might, if they had exercised the full powers given to them in the original concession, have made charges considerably exceeding those which had prevailed during practically the whole of the concession, and which had been the means of enabling many citizens to have the advantage of a supply of gas who would not have seen their way to become consumers at the price at which the Company were authorized to charge under the concession. It was now forty years since the opening of the water-works; and while the community had largely increased in number, the capacity of the works left something to be desired. It was, however, thought that the time had arrived when some increase of the works should be carried out. The Directors considered that it would be in accordance with the wish of the shareholders that they should confer upon this point with the authorities, and, if possible, meet their wishes with the view of seeing what was really necessary to be done to meet the requirements for an increased supply, and also to arrange for the money necessary to do it, which, the Board submitted, should be by joint expenditure of the city authorities and the Company. This might involve, at a later period, some additional financial arrangements. If so, the Board would submit this to the shareholders for their consideration. In the meantime, he assured them that, in dealing with this matter, which he hoped would be amicably adjusted, the interests of the shareholders would be fully protected by the Board. In conclusion, he desired to express the Directors' acknowledgment to the staff, both at Cagliari and in London, for the careful way in which they had fulfilled their duty to the Company. He trusted that the remarks he had made would commend themselves to the shareholders, before whom the Directors thought it right to put the present position and prospects of the Company. They had still as great confidence in the future as they had had in the past. He had therefore the utmost pleasure in moving the adoption of the report and the statement of accounts.

Sir Frederick Wigan, Bart., seconded the motion, which was unanimously carried.

Proposed by the CHAIRMAN, and seconded by Sir FREDERICK WIGAN, the interim dividend at the rate of 6 per cent. per annum was confirmed, and a dividend at the rate of 8 per cent. per annum for the half year ending Dec. 31, was declared (less income-tax), together with a bonus of 5s. per share.

Moved by Sir FREDERICK WIGAN, and seconded by Mr. A. G. BURNEY, the retiring Directors (Sir John Aird and Mr. F. W. Blunt) were re-elected.

Both gentlemen returned thanks. Sir JOHN remarked that he had been connected with the Company from its infancy; and he hoped to see the business carried to further success.

On the proposition of Mr. E. VAUGHAN MORGAN, seconded by Mr. BURNEY, the Auditors (Messrs. Turquand, Youngs, and Co. and Mr. R. S. Robb) were reappointed.

The CHAIRMAN said he should like to move a special resolution, recording the thanks of the meeting to their Manager in Cagliari, Mr. Sanna and his staff, for their efficient control of the Company's business. No one could work more loyally and favourably than Mr. Sanna in the affairs of the Company, and no one could carry them out more completely in the best interests of the Company.

Mr. S. SIMMELKJÖR seconded the motion, which was unanimously agreed to.

Mr. E. VAUGHAN MORGAN proposed a hearty vote of thanks to the Chairman and Directors for the satisfactory statement of affairs they had placed before the shareholders.

The motion having been carried,

The CHAIRMAN made acknowledgment of the confidence of the shareholders—adding that they would do their best to continue the dividends on as satisfactory a scale as now, and, if possible, try to earn some little increase in the future.

PUBLIC LIGHTING OF NEWCASTLE-ON-TYNE.

An Extension of Electricity Agreed to.

A proposal to light certain of the tramway routes in Newcastle-on-Tyne by means of electricity, which has been considered during the past few months, was finally agreed to by the City Council last Wednesday. It may be remembered that months ago the Watch Committee recommended that certain streets should be lighted by electricity, supplied from the tramways power station; but the Council deferred the consideration of the report, and directed the Committee to approach the Gas Company, with a view to ascertaining whether they would amend their terms for lighting the streets by gas. Correspondence ensued; and the Gas Company offered (see "JOURNAL" for Oct. 31, p. 326) to provide 206 pillar lamps, with shadowless lanterns and self-intensifying burners of 300-candle power each, at an annual total cost of £3 5s. 6d. each. This included an instalment of 5s. 7d. per annum, for six years, for the purchase by the Corporation of the automatic lighting and extinguishing apparatus proposed to be fixed; and as at the end of this period the appliances would have become the property of the Corporation, there would then, of course, have been a reduction in the total charge. In addition to this, the Company offered, if their tender was accepted, to put the 855 self-intensifying lamps already in use in the city on the same footing—supplying automatic lighting apparatus, and reducing the charge for maintenance by 2s. 1d. per lamp—which would have meant an immediate saving to the Corporation of about £90 per annum. As compared with an all-round price of £11 for the arc lamps, the Gas Company showed that the adoption of their tender would thus have led to a total yearly saving of £614. In spite of all this, however, the Watch Committee decided to adhere to their recommendation that the 180 electric lamps should be erected, at a cost of £1980 per year, including the amount annually required for the interest on, and redemption of, the estimated capital expenditure of £4500. Deducting £780 for the reduction in cost from £14 18s. to £11 on the 200 existing arc lamps, leaves the net cost of the electrical extension at £1200 a year; whereas if the Gas Company did the lighting, the net cost would have been £585 per annum—£674 for the 200 new lamps, less £89 reduction in charge for maintenance of existing ones. The Committee calculated that by the adoption of electricity (reckoning the 1000-candle arc lamps at 700 candles each) they would obtain a light of 126,000 candles; while the 206 gas-lamps, at 300-candle power each, would yield 61,800 candles. The recommendation in favour of electricity was only passed by the Watch Committee by the casting vote of the Chairman, Alderman Barber Ellis, who told the Council his reason for voting as he did was because "it was a question of buying from your own shop or from a competitor."

After the adoption of the recommendation by the Council had been proposed and seconded, Mr. Gillespie moved that the report be sent back to the Committee. He said it seemed to him to be a question of utilizing the plant at the power-station. Were the Gas Company not going to give them a cheaper and better light? In his opinion, the new and improved self-intensifying gas-lamps, placed 11 feet above the ground, would give a vastly superior, more brilliant, and more diffusive light than the arc lamps on standards 24 feet high. Mr. Robinson also urged that they did not want the upper storeys of houses lighted, but the roadways; and this would be cheaper and better done by gas. Besides, the Tramways Committee, it had been stated previously, would lose if they got less than £12 per lamp. Mr. Armstrong and Mr. Cruddis having both advocated the adoption of gas, Mr. Rodgers pointed out that the Corporation had twice as much power as they needed for the trams; and the plant was put down practically for the purpose which was now proposed. To develop the ratepayers' own enterprise was in the interest of the community. They should not curtail municipalization, but encourage it. Alderman Richardson thought they ought to have more information. In London, electric lamps were being replaced by the more recently-invented gas-lamps; and if they could get a better light for less money by using gas, it was the duty of the Council to do so. Competition had got them reduced prices from the Gas Company. Why, then, should the Corporation seek to monopolize the street lighting? Electricity was cleanly; but it was neither good for lighting nor for eyesight. The Mayor (Alderman J. Baxter Ellis) at this stage of the proceedings stepped into the breach with the remark that already provision had been made at the power-station for providing electricity for these lamps. They wanted more work for machinery which the Council had sanctioned. They had spent at the very least £12,000 to £14,000 of capital for the purpose of this lighting; and they could only utilize the outlay by extending the tramways or electric lighting. He further pointed out that capital was borrowed and material was ordered for the purpose on resolutions seconded by Mr. Gillespie, who was now opposing the Watch Committee's recommendation. The debate was brought to a conclusion by Mr. Hildreth, who said the question did not affect the present so much as the future of municipalization. Assuming they had the loss at present, he considered that, if it meant that in the near future they were going to have a material gain, from a business point of view they should submit to the present loss.

On being put, the amendment was lost by 34 votes to 12, and the Committee's recommendation was adopted.

SERIOUS GAS EXPLOSION AT DEVONPORT.

A gas explosion which did considerable damage and caused injury to four persons happened on the morning of the 3rd inst. on the premises of Mr. J. B. Love, draper, of Devonport. Work was in progress outside the shop and in the cellar in connection with the fitting up of a system of high-pressure gas lighting, which it was proposed to instal as an experiment. About half-past ten, Mr. Love detected a strong smell of gas, and went into the cellar to ascertain the cause. There was no light there, and he was groping his way along towards the place where the meters are situated, when an explosion occurred. Mr. Love was thrown down and stunned for the moment, while the ceiling of the cellar and the floor of the shop above fell on and partly buried him. Flames shot out from the gas-pipe; and the doors having been blown down and the place filled with *débris*, Mr. Love had some difficulty in getting out. He was, however, comparatively uninjured. In the shops above, the effect of the explosion was very serious. The window-frames were blown out, and the pavement strewn with broken glass and the contents of the windows. In the fancy department of the premises, the floor was torn up—the joists being broken—and the counters were overturned; while in other parts of the establishment the shelves were stripped of their contents and the walls and ceilings damaged. Fire broke out in the fancy shop; but the prompt action of the fire brigade prevented it spreading. Several of the assistants were injured, and two were taken to the hospital, where they were detained. Four other persons were treated. A secondary effect of the explosion was to set fire to the gas in the street; and flames burst up between the paving-stones. These were put out, and the main was afterwards laid bare for a considerable distance in order to ascertain if any further damage had been done. Mr. J. W. Buckley, the Gas Engineer and Manager to the Corporation, explained to the local reporters how the accident had been caused. It appears to have been wholly due to carelessness on the part of a workman. Mr. Buckley stated that a man who was making the final connection of a 2-inch service-pipe for the new high-pressure gas supply omitted to plug the end of the pipe in the building, with the result that the gas was flowing into the basement. A gas-jet burning somewhere in the cellar ignited the explosive mixture. As soon as the man discovered what he had done, he disconnected the main in the street; but the flames from the cellar ran along the pipe to the main, which caught fire. Mr. Buckley drove to the place immediately he heard of the accident, and found the men endeavouring to smother the flames in the street by earth. He got the firemen to play upon them, and afterwards had the main unearthed. Mr. Buckley said it was a most unfortunate affair, and that it all occurred in two minutes.

Liverpool and the Lighting of Fazakerley.

Last Tuesday, Major Norton, on behalf of the Local Government Board, held an inquiry at Liverpool with regard to the application by the Corporation for authority to become the suppliers of gas for Fazakerley. The intention of the Corporation to endeavour to secure a Provisional Order for this purpose was editorially referred to in the "JOURNAL" for Jan. 30, p. 271. The Town Clerk (Mr. E. R. Pickmere) represented the Corporation, and explained that objections to the Order had been made by the Cheshire Lines Committee and the Liverpool Land Company; but both bodies had withdrawn their opposition. The Land Company at present lighted the streets on their estate; and an agreement had been entered into with them for the Corporation to take over their mains and meters and to carry out the public lighting. At present, 2 miles 810 yards of streets were lighted in Fazakerley; 840 yards being lighted by electricity by the Corporation. Roughly speaking, there were 700 houses in Fazakerley; the population being about 3500. Evidence was called as to the necessity for the better lighting of the district, and the desire of the inhabitants to be supplied with gas for illuminating and cooking purposes. Mr. Higginbottom (a member of the Corporation) said that this question was the principal one at the recent election; and the Rev. T. J. Preece stated that he voiced the feeling of the inhabitants in expressing the hope that the proposed gas supply would be sanctioned as early as possible.

Reduction in Price Foreshadowed at Fenton.—A meeting of the Fenton Gas Committee has been arranged, to consider the advisability of continuing the supply of gas free of charge for public lighting, and the selling price of gas last year. It was hinted by the Chairman of the Council (Mr. J. Shenton) that such figures might be submitted as would induce the Committee to reduce the charge for gas by something approaching 6d. per 1000 cubic feet—which would mean an annual saving of £1500 or £1600 to the ratepayers.

LEEDS ELECTRICITY UNDERTAKING.

Criticisms by the Chairman of the Committee.

At their Meeting last Wednesday, the Leeds City Council adopted a report which had been prepared by Alderman Ewing Matheson, the Chairman of the Electric Lighting Committee, on the position of the undertaking. .This report, the Alderman explained, had been drawn up as an aid to the consideration of certain questions which would shortly have to be dealt with.

After tracing at length the history of the concern from the time when it was purchased from the House-to-House Electricity Company, Alderman Matheson stated that a considerable portion of the installation which was laid down by the Company at the commencement (in 1892-3) was out of date almost as soon as put down, though it was selected in accordance with the best practice of the time. He had come to the conclusion that it would probably be deemed advisable within a few years to reconstruct the older portions of the present works, with a view to utilizing the space to the best advantage, and so deferring the time when it would be necessary to erect a new works to supplement or supplant the present ones—an event which would involve a very great expenditure and some initial diminution of economy. The following were the chief causes of difference between the present real value and the present book value of the assets: Assets destroyed or discarded in consequence of wear and tear or obsolescence. Wear and tear of plant still in use. Out-of-date plant still in good working order, and still in use, but not of most improved design or of most economical size. Reduction of market prices of plant since date of purchase. Premium on purchase of undertaking, costs of issuing stock, &c. It would appear that the position of Leeds, with its capital expenditure of £85 14s. 5d. per kilowatt, was more favourable than that of electric supply companies on the average, notwithstanding the onerous terms of purchase of the undertaking. But, as compared with other municipal electrical undertakings, the burden upon Leeds was excessive to the extent of £9 16s. 5d. per kilowatt, or £113,332 in the aggregate; this apparent over-capitalization being more than accounted for by the estimated premium on stock issued in payment for the undertaking. Relying on the good faith of Parliament, the Corporation paid the Yorkshire House-to-House Company about £200,000 for goodwill, as the tangible assets were obviously worth that amount less than the value of the stock issued in payment of the undertaking. But this burden should, in the Alderman's opinion, be reduced; and it appeared undesirable to apply surpluses as profits to the relief of rates till the burden was reduced. Goodwill in the case of a municipal undertaking like that of Leeds must not be over-estimated. While the Act of Parliament conferred a monopoly for the present, it was obvious that if prices were charged beyond those paid outside the protected districts, other forms of lighting would be preferred, and public opinion would demand that a reasonable price should be charged, even if special means had to be taken to reduce the burden of capital. If the capital charges per kilowatt were reduced to the average figure of other municipal undertakings, it would mean a reduction of a farthing per unit in the average price at which electricity could be supplied; but this could not be effected while every surplus was directed to the relief of rates. In a successful manufacturing business, it was not unreasonable that the capital should be turned over at least once a year; but in the Leeds electric lighting undertaking, so great was the outlay for plant in proportion to its working hours, and so onerous was the provision for duplicate and stand-by machinery, that the capital was only turned over once in ten years. To put it more plainly, while the capital in the Leeds undertaking in 1905 (including estimated premium on 5 per cent. stock) was £989,236, the gross income during the year ending March, 1905, was only £84,416—not even equal to one turnover in eleven years.

Discussing the financial questions that were involved in the discarding of the old plant and the reconstruction of the works, the report stated that Mr. Dickinson, the Manager of the Electric Lighting Department, roughly estimated the cost of the scheme at £230,000, towards which he anticipated that a sum of £30,000 would be obtained by the sale of the discarded plant, leaving a net expense of £200,000. One of the conclusions come to by Alderman Matheson was that, apart from goodwill, the capital liabilities were in excess of the value of the assets, and that such liabilities were excessive in proportion to the capacity of the plant as compared with the average of other electric supply undertakings, and especially with municipal undertakings; that such excess of capital liabilities necessitated a scale of charges for current higher than would otherwise be required; that in addition to the redemption fund a substantial reserve was necessary to provide for replacements of plant needed before the loans for such plant were paid off; that the amount accumulated in the reserve or equalizing fund (£10,441) was not an adequate provision for such renewals; and that the sums taken from the undertaking for the relief of rates (£16,600) had been shown by subsequent events to have been not properly so applicable, but that if this amount with interest was refunded, and no further sums so withdrawn, the undertaking would probably be able to meet all claims upon it.

The following are among the recommendations with which the report concluded: That, assuming the scheme for the reconstruction of works to be approved, application should be made at the proper time to the Local Government Board for sanction to the borrowing of £120,000, or such other sum as shall bear the same proportion to the total estimated cost as the increase of capacity in the reconstructed works bears to the total capacity. That the remainder of the cost rendered necessary by combining what are merely renewals with extensions be carried to an extraordinary renewals account; and that the amount in the reserve or equalizing fund, together with any surplus that would otherwise, according to the old method, be called profits, be transferred to the credit of this extraordinary renewals account when the position of the account renders such transfer necessary. That until such provision is found to be unnecessary or excessive, any surplus, up to 3 per cent. on the entire capital, be placed to the reserve fund for renewals. That no further sums should be applied to the relief of rates, in any event, until the renewals now contemplated are fully provided for, and the net liabilities on capital account are reduced to the average of other municipal electricity undertakings, after which the question may be reconsidered.

In moving the adoption of the report, Alderman Matheson said the Council had not been much troubled with the Electricity Department; but as there was about a million sterling of Leeds money concerned, it demanded some attention. Ever since the House-to-House Company first commenced business, up to the present time, the plant had been well chosen as the best of its kind. Changes had been considerable and costly. Now there was still some plant to discard—not because it was old or out of repair, but because it was obsolete. Very large renovations had been required in the past; and further renovations would be necessary during the next few years. He did not want to create a scare. They could go along as they were for a year or more, and they had already got specifications in the hands of manufacturers for tenders for the new plant required; so that in a month or two they would be able to put before the Council details of what they intended to do. The department must not at present be looked upon as one from which surplus profits could be drawn for the relief of the rates. The Committee considered that they would have done their duty if they could steer the concern safely through rather difficult paths. They had borrowing powers; but obviously they could be exercised only for extensions. The Electricity Committee ventured to think that it should be left to them—subject, of course, to the final vote of the Council—and not to the decision of the Finance Committee, as to whether a surplus should be retained as a reserve within the limits authorized by the Local Government Board, and already sanctioned by the Council. It was a very modest request of the Electricity Committee that "until such provision is found to be unnecessary or excessive, any surplus up to 3 per cent. of the entire capital be placed to the reserve fund for renewals." The city did not lose; if they reserved too much in one year, it could be called up the next year. The electricity undertaking did not offer the magnificent returns of the tramways, with their hundred miles of rails; nor could they show such profits as even the Gas and Water Departments. It must not be thought, however, that they gave no profit to the city. They conferred great advantages which could be translated into a real money value. They stood well among the big cities for the steadiness and reliability of their supply. In regard to price, also, they compared well with other places; their figure of 4d. being less than the average. They charged no meter-rent, and they allowed 5 per cent. discount for prompt payment. The new tariff offered the best terms to those customers, large and small alike, who took the current in what would be idle hours; so that a small tradesman, if his work called for it, could get the same rebate as the largest manufacturers or shopkeepers—namely, a reduction from 4d. to 1d. when the lamps were used beyond a certain number of hours. There was another advantage the Committee gave to the city in the lighting of many of those streets—and they were now numerous—where the tramways passed. Out of the total 50 miles of streets with tramways, they were now lighting about 16 miles of route by means of 650 lamps, and they were doing it for the small payment of £5000 per annum. He did not say that the Gas Department could not, by the aid of incandescent mantles, light the streets as cheaply; but at similar prices, the electric light was twice as good. Mr. Dickinson, their able Superintendent, told him that they were up to the very highest standard of street lighting in the whole country. The Committee were offering great inducements to those who would use their current as power. While they could supply all applicants, large as well as small, they offered particular advantages to the small manufacturers. Those who wanted anything from 1 horse power to work a few sewing machines, up to 50 or 100 horse power to work a factory, not only could get it cheaply—at about 1¼d. per horse power per hour—but they were saved from all capital expenditure for engines, boilers, or brickwork, and had no idle hours to pay for, but were charged by meter for exactly what they used. The sinking fund charges were twice as great as the cost of manufacturing and distributing the electric light; and as long as they had these burdens, they could not reduce the price. But they looked forward to the time when, the sinking fund period being ended, they would be in a position to lower the price. As long as he was connected with the Committee, he would aim at keeping the plant up to perfection out of their earnings; but they could only do this if their earnings were left to them. His predecessor, Mr. Wigram, put forward the same views; but for reasons of which he (Alderman Matheson) was not cognizant, they were not carried into effect.

ELECTRICITY v. GAS AT WORCESTER.

An interesting and highly-instructive discussion took place at the last meeting of the Worcester Watch Committee. One of the duties of the Committee is to supervise the lighting of the streets in the city. They perform this duty as impartially, perhaps, as is to be expected from members of a Corporation burdened with an electricity undertaking which is always in financial difficulties. Any advantage the Committee can give the Electricity Department in the way of remunerative business, they are naturally anxious it should have. The Committee's impartiality has, however, never yet extended to the point of allowing gas to make a fair show. Though gas holds its own in Worcester, as elsewhere, many of the streets of the old city are still lighted by flat-flame burners in old-fashioned lanterns, with the result, of course, that nothing like the maximum lighting efficiency is obtained from the gas.

At their last meeting, the Corporation Watch Committee were called upon once more to decide between gas and electric lighting. It was stated that it had been resolved to extend the electricity cables along the Bromyard Road; and the Electricity Committee asked that the lighting of this thoroughfare should be entrusted to them, and fifteen or sixteen electric lamps put up in place of the existing gas-lamps. Mr. J. Jeff asked whether the Committee would make a profit out of the lighting, or intended to do it at a loss; and he received from Mr. A. H. Parker, the spokesman of the Electricity Committee, the assurance that it would result in a distinct gain to the undertaking. It was

pointed out by Alderman Price that this was not the only question to consider; the really important point was which would be the better light. Naturally, Mr. Parker stood up for electricity; while Alderman A. Birch, the Chairman of the Gas Company, put in a claim for incandescent gas lighting. As a resident in the neighbourhood, Mr. G. H. Loach asked for an assurance that electricity would cost no more than gas, and would give as good a light. Mr. Parker guaranteed at once that the electric lighting would be infinitely superior, and said the cost would be £3 per lamp. The Mayor, who expressed the impartial opinion that the question of which was the better light was one of individual taste and preference, pointed out that the Gas Company charged £2 18s. 6d. per lamp, as against £3 charged by the Electricity Committee. Mr. Parker said the electric lamps were lighted for more hours than the gas-lamps; and if the lighting hours were reduced, the charge should be the same as for gas. Upon this, the Committee decided by a majority of 7 to 3 to reduce the lighting hours, and to pay £2 18s. 6d. per lamp. The Electricity Committee are thus to have an opportunity of extending their operations, and of adding a trifle to their revenue.

A further extension of electric lighting was perhaps foreshadowed in the reference to a Committee of the question of adopting uniform hours for gas and electric lighting, though it may mean only that the Watch Committee propose to get the electric light at the lowest cost.

GAS AND ELECTRIC LIGHTING IN NEW YORK.

First Report of the State Commission.

The first annual report of the New York State Commission of Gas and Electricity, which was constituted last year, as recorded in the "JOURNAL" at the time, has lately been presented to the Legislature. It summarizes the New York City investigation which has been going on for some time, but gives no idea of the proposed action of the Commission. They report returns from 475 companies, of which 399 were operating. Fifty were gas and electric, 188 electric, 51 coal gas and water gas, 17 oil gas, 38 natural gas, 22 acetylene, 30 municipal electric, and 3 municipal gas. Of the 156 electric companies, 34 paid dividends; of the 50 gas and electric companies, 14 paid dividends; of the 51 coal and water gas companies reported on, only 8 paid dividends. The bonds and stock issued by all the lighting and power companies of the State amount to $531,251,468, equal to about $75 for each inhabitant. The individual and municipal plants represent an investment of $1,101,349. The amount of gas of all kinds sold annually to consumers is 36,397,747,816 cubic feet; and the quantity sold for public lighting 1,569,446,124 cubic feet. Municipal lighting industries in the State show comparatively small increases; there being thirty municipal stations, compared with 28 in 1900, with an authorized issued bonded indebtedness of $563,978, compared with $519,340 in 1900. Companies in New York City furnish 78 per cent. of the total amount of bonds and stock issued in the State by companies furnishing gas only, and 93 per cent. of the total sales to consumers. Of purely electric companies, New York City furnishes 71 per cent. of the capitalization and 77 per cent. of the commercial incandescent lamps. Nearly half the public enclosed arc lamps employed in the entire State for street lighting are in use in New York City; and 3250 open arc lamps, as against 2045 in the rest of the State. The Commission granted only 40 per cent. of the increase in stock and bonds applied for.

MUNICIPAL ELECTRIC LIGHTING IN CALIFORNIA.

An Object-Lesson at Alameda.

Recent issues of the "American Gaslight Journal" contained a reprint of an article by Mr. L. A. Redman, in the Alameda "Daily Argus," in which he gives the result of eighteen years of municipal ownership of the electric light undertaking in that Californian city. He presents a story not devoid of interest for ratepayers on this side of the Atlantic. The following are some extracts from the article.

About eighteen years ago, the city of Alameda embarked in the business of lighting its streets and public buildings by means of electricity, and more recently (since 1895) has been supplying private dwellings, stores, &c., with electric lights. The undertaking was begun, and has been carried on, under the most favourable conditions, physical and moral. The territory which comprises the city is about 3½ miles long by about a mile in width; it is level throughout; the soil is sandy; and the dwellings are evenly distributed on regular blocks facing broad streets. The population is now about 20,000. There is a navigable channel along the northern boundary of the city, by means of which fuel can be supplied to the power-house at the lowest cost. The Board of Trustees of the city has been composed of men of probity and intelligence, whose chief aim has been the maintenance of good government.

Encouraged by these most favourable conditions, the people resolved to try the experiment of municipal ownership and operation of a lighting plant. The first step, taken in December, 1887, was the purchase of a plant, for which the city paid the sum of $40,000. It was subsequently ascertained that the plant cost the seller $18,200 to construct and equip. This plant consisted in part of 13 tall iron masts distributed throughout the city, carrying at their tops 54 arc lights in all. This purchase was made in the belief that lights placed at the top of these masts would sufficiently illuminate the streets of the city. Experience has shown, however, that this belief was unfounded; and the city has been for many years chiefly illuminated by low lights. The machinery, poles, wires, &c., purchased by the city were of a primitive and cheap character. Part of the purchase price was realized from a sale of bonds for $25,000 issued by the city, $7500 of which are still unpaid, though the original plant has almost wholly disappeared.

Several months ago, I began an investigation with the view of ascertaining accurately the cost to the citizens of Alameda of conducting this business during the eighteen years it has been engaged in it. Some idea of the muddled condition of the accounts kept by the city may be gathered from the fact that, in response to a request from a citizen for the same information I was seeking, the President of the Board of Trustees stated that the furnishing of this information (which could have been readily obtained from books kept as are the books of private corporations engaged in the same business) was a "human impossibility." He says that the records of the electric light plant up to 1899 or 1900 were so kept that, "if the entire Board of Trustees went to work in conjunction with four expert accountants, it would take us four years of our natural lives to get a report that would be a direct, full, and unequivocal reply to your questions."

Bad as the case is, however, the picture was somewhat overdrawn by the President of the Board of Trustees. After laborious investigation, I have succeeded, with the assistance of an accountant, in getting from the records of the city about half of the information I was seeking; and, fortunately, I was furnished with the balance by a report made in April, 1896, by an accountant employed by the Municipal Ownership League of Alameda to ascertain the cost of municipal lighting in the city up to that time. There were no separate accounts kept of the lighting business from the date of purchase up to April 1, 1896; and it was not until June 30, 1903, that a book-keeper was employed and systematic account-books opened.

The results of my investigation are set out in the following table, which contains an accurate statement from year to year of the amounts (with interest separately stated) expended for materials and labour, including the purchase price of the original plant, necessary to instal and maintain it from Dec. 1, 1887, to June 30, 1905, and also shows the receipts from the sale of current to private consumers and other credits. In a final column I have set forth the steadily rising tax-rate in Alameda since the purchase of the plant.

Year.	Investment and Construction.	Operating and Repairs.	Interest on Investment.	Receipts from Sale of Current, &c.	Actual Value of City Lighting.	Tax-Rate. (Fiscal Year.)
(Calendar)	$40,000					
1888*	4,950	$10,250	$2,170	$1,370	$7,500	$0·90
1889	2,000	7,800	2,665	—	7,600	0·90
1890	6,100	8,850	3,035	—	10,200	1·15
1891	1,000	8,900	3,300	—	13,150	1·15
1892	2,100	9,700	3,550	—	13,150	1·15
1893	1,000	9,100	3,410	—	12,420	0·95
1894	2,400	8,600	3,485	—	12,690	1·00
1895†	20,250	16,200	4,110	4,300	18,300	1·22
1896	—	—	—	—	—	1·10
(Fiscal)						
1897	18,600	14,050	5,020	7,100	11,430	1·12
1898	6,550	15,040	5,700	7,000	13,710	1·05
1899	6,100	15,800	6,035	8,200	12,700	1·13
1900	4,400	18,800	6,425	6,900	13,500	1·20
1901	6,900	22,900	7,050	8,100	15,500	1·20
1902	12,300	25,000	7,900	13,000	16,800	1·25
1903	9,000	23,600	8,550	12,300	16,500	1·25
1904	12,900	24,400	9,285	15,000	16,650	1·38
1905	16,900	29,100	10,250	23,440	17,350	1·28
1905‡	15,500	—	—	—	—	—
Totals	$188,990	$268,090	$91,740	$106,710	$229,250	—

* For 13 months from Dec. 1, 1887. † For 18 months to July 1, 1896. ‡ From July 1, 1905, to Nov. 1, 1905, taken from electric plant books; it includes expenditures before July 1, 1905, the warrants for which had not passed to the City Clerk's office.

Professor C. L. Cory, of Berkeley, appraised the plant in 1904 at $70,000. This figure has been accepted by the city, and has been entered as a basic asset on its books. In my computation of the loss to the taxpayers of Alameda in conducting this business, I have accepted this estimate as correct, though I think it is too high. Making the necessary additions to, and deductions from, this figure on account of purchases and depreciation since 1904, I find the present value of the plant to be $88,700.

From the foregoing figures the following conclusions may be drawn:—

Amount expended on account of investment and construction	$189,000
Maintenance and operation	268,100
Interest	91,700
Total	$548,800
Amount received by city from private consumers, &c.	$106,700
Value of public light supplied by city, as determined by experience of Oakland and Berkeley during same period	229,300
Estimated value of plant	88,700
Total credits	$424,700
Net loss to taxpayers to date	$124,100
	$548,800

The foregoing exhibit is, of course, a complete refutation of the statements repeatedly made, even in official reports printed at the public expense, that municipal lighting in Alameda has been a successful business enterprise. These misleading and unveracious reports have been circulated far and wide, and have been instrumental in inducing other communities to repeat Alameda's folly. They are vitiated by devices familiar to all students of official reports of municipal businesses, such as omitting interest on the investment, failure to make deductions for depreciation of plant, employment of superseded figures in estimating cost under private enterprise, &c. The reports which have been issued from time to time by the city showing the cost of public lighting do not take into account purchases of machinery, supplies, &c., which had to be replaced again and again in the operation of the plant. They leave the impression that the difference between the expense of operation and the total outlay represents present

existing values; whereas, by depreciation of the plant, consumption of supplies, &c., this margin may have largely or wholly disappeared.

In the annual report for the year 1904 issued by the city, it is assumed that the public lighting for that period, if furnished by a private corporation, would have cost the people of Alameda $22,037; whereas at the rate the people of Berkeley paid that year the service which Alameda received would have cost less than $15,000. The sum of $40,000 originally paid for the plant was derived from the sale of bonds for $25,000 and $15,000 in cash, which was in the city treasury as part of the proceeds of a sale of "sewer bonds." The interest on this sewer bond money has never been charged against the electric light plant investment, and is not mentioned in any of the electric light reports. The unusually high rate of taxation for the year 1904 ($1·38) was due to the payment of $13,000 of "sewer bonds," the money for which, however, had been used in part payment of the original purchase price of the electric light plant. The interest on the $25,000 of bonds appears in some, but not in all, of the electric light reports. Nothing has been charged in these reports for depreciation (except in one instance); leaving, as above stated, the impression that the difference between the total expenditures and the operating expenses represents the present values.

In a report issued in September, 1895, it is stated that the cost of lighting an arc lamp per month is $5·54; whereas the City Electrician's report, filed the next month, states that up to that time the cost had been $8·25 per month, and in the report of the Accountant employed by the Municipal Ownership League, it was estimated to be $13·30 per month. The original contract of purchase, nearly every annual report of the Superintendent, many other papers and documents, including Professor Cory's report, have disappeared from the files; and if a copy of the report of the Accountant employed by the Municipal Ownership League in 1896 had not been preserved by him, it would have been almost impossible to fully expose this tax-eating failure.

The "inexhaustible credulity" of sensible business men regarding questions of municipal ownership and finance is a curious and puzzling phenomenon. Once the municipal ownership idea gets possession of them, they become so hypnotized that, in estimating the worth of a proposal, they no longer apply the approved tests and standards by which they regulate their private affairs, and indulge the wildest hopes concerning projects which their business experience, if not their common sense, should tell them are utterly visionary and impracticable. Worse than this. They make a fetish of municipal ownership, and insist on preserving it as though it were something to be judged otherwise than by its results. I am informed that a member of the Board of Trustees of Alameda, on being asked why the Board did not buy current for 3 c. per kilowatt, which admittedly was cheaper than the city could produce it at, replied that if the Board did so "it would be the beginning of the end of municipal ownership." Though as boys they were taught to believe, and as men have seen the truth daily exemplified, that "what is everybody's business is nobody's business," yet in respect to questions of municipal ownership they disregard this maxim, and ignore as unworthy of notice the experience of ages upon which it rests. After each failure arising out of inherent defects in the scheme, the hope is confidently expressed that the future will be unlike the past.

There are several factors, not already alluded to, which should be taken into consideration in correctly estimating the cost of maintaining this public lighting plant. In the first place, taxes are levied on a private, but not on a public, plant. This loss in taxes must be made up by higher taxation on private property. Here is a direct loss to the people, and an element which should be, but rarely is, taken into account in comparing a public with a private enterprise. Then it must be remembered that the profits of a private enterprise are not a loss to the community. Dividends on the stock of private corporations are widely distributed, and are invested in new enterprises which otherwise might languish or cease to exist. Next there is the question of the responsibility for negligence in the operation of the plant. A private corporation is rigidly obliged by law to respond in damages to those injured, and to the heirs of those killed, by its negligence. Not so the city. . . . Another element to be considered is the difference between the salaries and wages paid by a private company and those paid by the city. Alameda up to Aug. 1, 1905, paid its Electric Light Superintendent but $125 per month. No private corporation would be able to secure the services of a competent superintendent at such a salary; nor is such a salary adequate compensation for the proper performance of his duties. In addition to this, the city receives the services of the members of the Board of Trustees gratis. Why should this be so? Why should not the Trustees be paid for the services they render? If the city is going into business, let it do business on a business basis, and pay for what it receives as other corporations do. . . . Finally, the plant itself is in poor condition, the lights are badly distributed, and the service is unsatisfactory. The cheapness of the plant renders a large expenditure necessary each year to repair and renew it; and the machinery in the power-house will have to be considerably increased in capacity in the near future. There are distributed throughout the streets 500 incandescent lamps of 25-candle power, which could be replaced by 40 arc lamps of equal efficiency, and thereby save the city $5000 per annum. Parts of the city are over-lighted, and parts insufficiently lighted or not at all.

If the glamour which political superstition throws around this governmental undertaking were dispelled, it would be seen clearly that the city is constitutionally unfitted to conduct this business, or any other similar business, successfully. It is not the function of the government —city, state, or national—to engage in such enterprises in competition with its own citizens. To do so it must abdicate its proper functions, leaving them unperformed while it wastes its energies upon projects which it is not qualified to conduct efficiently. It was a mistake for the city to enter into this lighting business. It is sheer folly to continue in it. Seven years ago, the "Argus" said: "As a business venture, Alameda's experiment is a rank and wretched failure." The foregoing review of the results of the experiment to date requires the renewal of the same verdict to-day. If, then, municipal ownership has proved such a signal failure under the most favourable conditions, what may we expect under average conditions or when they are below par?

I subjoin a few objections which occur to me to ownership of so-called "public utilities" by communities at large: It would increase the number of office-holders and politicians; it would restrict individual liberty, and deaden individual initiative and enterprise; it would create a trust subject to no competition whatever; like all governmental undertakings, it would be extravagantly and inefficiently conducted; its operations would be hampered by "red tape;" the scope of its powers, duties, and responsibilities would be the subject of endless controversy and litigation; capability and honesty would not be the sole tests in the selection of officers and employees, for political influence would be a large factor; an inefficient administration could not be promptly overthrown; party allegiance and the excitements incident to elections would render the formation of calm and correct judgments impossible; it would be a partnership in which everyone, without regard to his wisdom, experience, or character, would have an equal voice; political pressure, tending on the one hand to raise the wages of the employees and on the other to lower the price of the commodity produced, would cause a chronic deficit, and this would have to be met by taxation, which never has been, and probably never will be, controlled by equitable principles; there would be little incentive to improve methods in use, or to adopt new appliances or devices (Government officials the world over are obstructive and unenterprising); and the movement towards expansion of Government duties is in opposition to the law of progress, which requires, and implies, specialization of structure and function.

Another objection may be raised to municipal control, because it is not the business of Government to provide generally for the people, but to see that each one in providing for himself has fair play. If this function were better performed by the Government, the abuses which cause dissatisfaction with private ownership would, in large measure, disappear. If the Government were a master of one trade, instead of a jack of many trades, a realignment would be established, whereby each member of society, while exercising with the utmost freedom his own rights, would respect the rights of others. Finally, and chiefly, municipal ownership is objectionable because each extension of governmental control swells the forces which are dragging us downward into the Socialistic pit.

UNIFORM v. DIFFERENTIAL PRICES IN GERMANY.

The owners of the municipal gas undertaking at Rixdorf have determined to abandon the differential system of charging for gas, in favour of a uniform rate of 13 pf. per cubic metre (equal, at the present exchange of 20·50 marks per £1, to approximately 3s. 7d. per 1000 cubic feet). The alteration is to date from the 1st of April next, when consumers who use slot meters will receive for the same amount of money 625 litres, instead of the 600 litres they have hitherto had. Among the reasons which have induced them to abolish differential charging, the proprietors point out that Charlottenburg was the first town in Germany to introduce uniform rates, and that since 1897, when the change was made, the annual consumption of gas has risen steadily from 527 million to 1185 million feet (in 1904). The same system was adopted in Berlin in 1901, both in connection with the municipal gas undertaking and by the Imperial Continental Gas Association; and since that date it has made rapid strides in different parts of the country. Moreover, it is found that the use of electric light is spreading extensively, especially among owners of business premises, who are willing to sacrifice the undoubtedly greater cheapness of gas as a source of light for the minor advantages of the electric current. A reduction in the price of gas for lighting purposes was therefore desirable, whereas an increase in the price of the cheaper gas sold for heating purposes was called for through the rise in the cost of coal and the growth of capital expenditure. Nevertheless, it was held that a modification in the system of differential prices in which the two rates charged should be brought closer together would not effect the object in view so well as the inauguration of a uniform rate. It is estimated that the latter will cause a falling off in the receipts of the Rixdorf undertaking equal to £4000 during the present year. But, on the other hand, £2500 will be saved in the meter account, and nearly £350 in other directions; so that the net loss will not exceed £1200. Consumers will benefit by no longer having to use two different meters and double service-pipes; and the labour of reading the meters will be correspondingly reduced. The example of other towns has shown that the change in the method of charging will not appreciably increase the amount payable by the average consumer; while the small expenses involved in certain cases in altering the services, &c., will be borne by the undertaking.

Concession to Gas Consumers at Ilkley.—At last week's meeting of the Ilkley Urban District Council, it was stated that the profit from the gas undertaking during the past year had amounted to £2200. It was decided to transfer £1400 of this to the relief of the rates, and £700 to loan capital account—this being the amount overspent on Heber's Ghyll Drive. It was also decided to reduce the price of gas, as from April 1, from 2s. 10d. to 2s. 8d. per 1000 cubic feet, with 5 per cent. discount—making the net price practically 2s. 6¼d.

Gas Prices and the Rates at Longton.—Mr. Tams, a member of the Longton Town Council, is of opinion that it is time the Gas Committee gave some consideration to the consumers, and discussed the advisability of reducing the price of gas still further. At the last meeting of the Council, he gave expression to this view; but Mr. Brookhouse pointed out a difficulty in this direction. So long, he said, as the Council were determined to take every penny for the relief of the rates when a margin was shown, the town could not have a reduction in the price of gas. To this, Mr. Tams retorted: You make the consumers pay twice—in gas and rates. Mr. Brookhouse said he had sympathy with the consumers; but the Council must conduct the gas-works on sound financial lines, and not cripple the undertaking for the sake of temporary benefit in any one year. The gas-works had been drained in the past; and it took a large portion of the profits to meet the calls on capital charges, before any money could be set aside for the relief of the rates.

DEVONPORT WATER ARBITRATION.

An Agreement Arrived At.

The Town Council of Devonport, at their Meeting last Thursday, had under consideration a report by the Water Arbitration Committee, recommending a compromise of the points in dispute between the Corporation and the Water Company, and the offer of a sum of £244,000 for the Company's undertaking. The Council discussed the matter in private, and adopted the recommendation; their resolution adding that the £244,000 is to include all costs payable to the Company, "and that the Umpire be requested to make an award upon this basis, providing that the Water Company agree thereto." A meeting of the Directors of the Company was held on the same day, at which it was decided to accept the compromise. It now only awaits confirmation by the shareholders, and the formal award of the Umpire. When these have been given, an end will be reached of a long and costly arbitration; and the transfer of the undertaking, which received parliamentary sanction in 1902, will take place.

The arbitration proceedings began in April, 1903, the late Sir Frederick Bramwell being the Umpire; while Mr. G. H. Hill was Arbitrator for the Corporation and Mr. Charles Hawksley for the Company. But Sir Frederick Bramwell died in November of that year without having made his award. In March, 1904, Mr. A. J. Ram, K.C., was appointed Umpire; and the legal points having been argued before him, he made his award in November of that year in the form of a special case. Between the Company and the Corporation there was a difference in the interpretation of section 20 of the Company's Act of 1793, under which the Admiralty have certain rights of supply. The question in dispute was whether the Admiralty are restricted, in the use of the water supplied under these special conditions, to the precincts of the Dockyard as it existed at the passing of the Act. Mr. Ram awarded the sum of £268,123 to the Company in the event of the Court being of opinion that the user of the water was restricted, and £209,920 if it was decided that there was no such restriction. Mr. Justice Phillimore, in the King's Bench Division, came to the conclusion that the Admiralty were not under any restriction; and he gave the Company the option to have the case remitted to the Umpire for a further statement of facts. The matter was taken to the Court of Appeal, and their Lordships ordered the case to be remitted to the Umpire. The arbitration was accordingly reopened on the 26th ult. During these proceedings, negotiations took place between the parties, with the result that the sum of £244,000 was agreed upon as a compromise. This sum was arrived at by adding one-half of the amount in dispute—£29,180—and the sum of £4980 for costs, to the lower figure of £209,902 mentioned in the award. It is now anticipated that the transfer of the undertaking to the Corporation will take place on the 30th of June next

NEW WATER-WORKS FOR DENBIGH.

An Overflowing Borehole—Gas Pumping Plant.

For several years past, the Denbigh Water Company have had under consideration the best means of increasing the supply and improving the quality of the water—having realized that the original source, increased as it has been of recent years by the pumping from a spring at the River Ystrad, was not quite what they wished it to be. With the view of effecting some improvement, the Company's Engineer, Mr. F. Storr, of Wrexham, set to work "prospecting" the district, with the result that two sources were found to be available—one at Llwyn Brân and the other at Llwyn Issa. The latter was eventually secured, and a borehole was sunk, from which water of a very high quality—pronounced by Professor Percy Frankland to be an "ideal" water—was obtained. Of this water, 400,000 gallons per day were found to be within the limits of the Company's supply. The necessary works were carried out; and they were recently opened by the Chairman of the Company (Mr. P. H. Chambres), in the presence of a numerous assembly.

The borehole is in the Vale of Clwyd, about 1½ miles from Denbigh. It is 384 feet deep, and, in order to prevent any surface water percolating to the springs, it is lined with tubes to a depth of 90 feet; the base of the tubes resting on the water-bearing strata. The water is delivered to the surface under pressure; the quantity overflowing being 350,000 gallons per day, or more than three times the present requirements of the district. It is conveyed from the borehole to a tank adjacent to the engine-house, and is pumped thence through a 7-inch main to the works of the Company, and delivered into the covered reservoir, the water-level of which is some 350 feet above the pumping-station. The pumps are of the horizontal type, having triple rams of gun-metal 8 inches in diameter and 12 inches stroke. At the normal speed, they are capable of delivering 12,000 gallons of water per hour under a pressure of 150 lbs. per square inch. They are driven by a Campbell gas-engine of 40 brake-horse-power, working with producer gas on the suction principle. No holder is necessary; the gas being produced in the generator only as it is required by the engine. This can be started and the pumps set going in less than half-an-hour; and the attention required is reduced to a minimum. The engine and pumps are placed in a substantial brick building of pleasing exterior, and ample light is provided by large windows. The interior is of glazed bricks of a warm, brown colour, with a specially moulded dado, above which the bricks are white enamel. The engine-house is large enough to enable duplicate plant to be installed, when required, without any addition or alteration. A travelling crane spans the floor space—thus providing ample means of lifting any portion of the engine and pumps for examination and repair. The whole of the work has been carried out under the supervision of Mr. Storr. The Contractors for the borehole were Messrs. Timmins, Limited, of Runcorn; and for the gas-engine, producer plant, and pumps, the Campbell Gas-Engine Company, of Halifax.

The Chairman having started the engine, the company inspected the works and then returned to Denbigh, where they had dinner, at the Bull Hotel, under the presidency of Mr. Chambres, to celebrate the event. Mr. C. Cotton proposed "Success and Extended Prosperity to the Denbigh Water Company," coupling with the toast the names of Mr. Chambres and Mr. E. J. Swayne (the Company's Solicitor). The Chairman gave "The Engineer," which was cordially received. Other toasts were responded to by Mr. J. B. Woolley, the Contractor for the buildings; Mr. Wormald, the representative of the Campbell Gas-Engine Company; and Mr. W. E. Brock, the Manager and Secretary of the Water Company. The last-named gentleman presided a day or two later at an entertainment given by the Company to the workmen who had been engaged in carrying out the new supply.

THE GELTSDALE WATER SCHEME.

Claim for Compensation by the Earl of Carlisle.

For several days towards the close of last month, Mr. John Farrer sat as Umpire at the Surveyors' Institution, Great George Street, in respect of a claim made by the Earl of Carlisle against the Corporation for compensation for damage to his property by the carrying out of their Geltsdale water scheme. His Lordship claimed in all about £32,600, including £22,000 in respect of the water gathering properties of the estate. The Corporation offered £2400 in settlement of the full demand. This sum included nothing in respect of the water—the Corporation contending that, inasmuch as the Earl has no right to sell it, he has none to compensation; and, further, that he might, if he chose, dig behind the springs on his estate, and thereby deviate the watercourse so that the city would not get any supply. The Earl appointed Mr. Hesketh, F.S.I., of Penrith, as his Arbitrator; and Mr. T. Fenwick, M.Inst.C.E., of Leeds, represented the Corporation.

The case for the claimant was conducted by the Hon. J. D. Fitzgerald, K.C., who had with him Mr. Arthur Du Cane. Having explained the circumstances under which the Corporation undertook to carry out their new water scheme, he said the Geltsdale property consisted of 6000 or 7000 acres, and upon it there were two streams, known as the Old Water and New Water, from which the Corporation were entitled to take some 9 million gallons a day above a certain point. As there was only one house upon the ground, and as it was a grazing and sporting estate only, with no road or right-of-way across it, the water obtained was of the very best quality. It was here that the damage for which compensation was claimed was caused by the works of the Corporation. In estimating the damage to the estate, Counsel contended that it was obvious that they could not consider detached pieces of land for rental value, or anything of that kind; and as the property had hitherto been absolutely free from intrusion, and, for sporting and other purposes, was of increased value for this reason, the presence of pipe easements held by another owner, with their resultant works and power of inspection, gave rights that must prejudicially affect the farm portion as a sheep farm. As a sporting property, also, the damage was obvious. It was in part a driving-moor; and it was clear that a shooting tenant, when he found a municipal authority had rights over the moor, would not take it at all, or would pay only a reduced rent for it. Then there was a small corn-mill dependent upon the water, and also fishing. Altogether, he estimated the damage in respect of these matters at £10,000. But the largest element was to be estimated in relation to the capability of the estate as a water-producing area. The Corporation took, or had power to take, all the water of the watershed known as the Old Water, all of which was on Lord Carlisle's estate. They were also entitled to take the whole of the New Water above the point of the intake, a considerable portion of which was also upon his Lordship's estate.

The first witness called on behalf of the claimant was Mr. T. Wainwright, who said the presence of strangers would lessen the value of the sheep farm; and that the 5750 acres known as the Geltsdale farm, with additional shooting making a total of 11,757 acres, was let in one lot to a tenant for £600 per annum, and a contribution of £50 a year towards the rates. Witness estimated the loss on sheep wool, owing to the difficulty of washing on the Geltsdale farm, at £4583; the reduction of the rental from the shooting, at £1801; the cost of making a road and bridge in place of a ford acquired by the Corporation, at £450; and the fishing rights depreciation, at a figure which, added to £22,600 for the value of the estate as a water-bearing area, made a total of £32,602. Witness admitted that Lord Carlisle had never received anything for the water so far, and that to use it would probably necessitate an outlay of £200,000. It was with this large expenditure in view, and the fact that there was not likely to be competition for its purchase, that he had claimed only ¼d. per gallon for the water.

Mr. J. Clark, of Haltwhistle, the agent for a number of estates in Cumberland and the neighbouring counties, endorsed a statement made by Mr. Fitzgerald in the course of his opening, that the Corporation, when before Parliament, stated that, instead of providing a reservoir and compensation water—the usual course in such cases—they proposed to compensate every one individually. The depreciation on the Geltsdale and Alton Lee Estate, so far as the shooting was concerned, he estimated at £50 per annum. As regarded the depreciation in fishing, he thought £10 per annum would be a reasonable amount. Dealing with the value of the water to be taken by the Corporation, he said he would estimate the total royalty to be paid at £885 2s. 6d. per annum, which, capitalized at 25 years, would amount to £22,888, or a total of £33,559 compensation for depreciation in value and water taken.

In cross-examination by Mr. Balfour Browne, K.C., who (with Mr. Ernest Page) appeared for the Corporation, witness admitted that the water from two of the springs had already been given to the town of Brampton by Lord Carlisle. Asserting that Newcastle was a possible competitor for the water, he further admitted that Mr. Hawksley had stated in Parliament that the Newcastle Corporation would be bound to protect their own capital, and that though they had a supply that would be sufficient for 31 years, they would probably be obliged to look for a new one in about 20 years. He was aware that Newcastle had many other sources to which it might look; but he could not

say how long it would be able to carry on without any new supply. Whereupon Counsel remarked that if Newcastle had sufficient water for 31 years now, and had other sources of supply, it looked as if it would be a long time before that town came in. To this observation, witness made no reply.

Mr. Henry Rofe was the next witness. He furnished particulars in regard to the arbitration between Mr. Lever and the Corporation of Liverpool, and explained that in that case the Corporation bought the whole of the estate with the exception of 45 acres. He said a large part of Mr. Lever's claim was for the water on the estate.

Mr. G. Grey, the agent for Earl Grey and the Marquis of Waterford, gave evidence as to the damage the works would do. He said that if a possible tenant were viewing the estate and saw the pipe-lines, he would either offer less for the tenancy, or not accept it at all.

Mr. W. Dobson, brother of the tenant of the Geltsdale farm, spoke to the serious depreciation that would take place in the condition of the sheep, and in their fleece, from the absence of accommodation for washing, as well as from disturbance.

The other witnesses for the claimant were Mr. T. Brown, the head gamekeeper to Lord Carlisle; Mr. James, his estate clerk; and Mr. Mitchell, who let the moor to the present tenant.

Mr. Balfour Browne then opened the case for the Corporation. He contended that the values submitted by the other side were exaggerated in several particulars; and a claim had been made which could not be substantiated in law. With regard to the mere question of the land taken, he was glad to say there was practically no difference between them; and the Surveyors on both sides had agreed as to the measurement, and that the price should be £100 per acre. They had, therefore put down £518 for that. As to compensation for compulsory sale, they thought the Umpire would come to the conclusion that £100 was sufficient. With regard to the Castle Garrock meadow, in connection with which £333 was claimed for deprivation of water, the Corporation's answer was that there would be no deprivation at all. The land was taken on the margin of a reservoir, and under section 12 of their Act the Corporation were bound to supply watering-places sufficient for the park. Therefore, Lord Carlisle's claim on that ground should go. At the same time, they were taking a bit of the meadow, the compensation for which they put at £100 an acre, or £163. This, added to the £518, made a total of £681. As to the easements for the pipe-lines, he understood when he paid for them that the payment included damage done by the pipes, and gave a right to inspect them from time to time, and repair when necessary. They necessarily had to go through the crops of a tenant for the purpose; and they would, of course, compensate him for any damage that was done. In the Gelt Valley, they had 3003 yards of pipes, for which they allowed 3s. per yard, or £451 4s., in addition to which they put down £1 each for 19 manholes, &c., making for the land and pipes and manholes a total of £905 16s. This with the other items made £1592 1s. To it they added an allowance of 10 per cent., or £159 4s., making £1751 5s. As to injuries of other kinds, no doubt during the construction of the works there would be some disturbance of game. He did not think it would be great, and the fact that last year they had their "swagger" day of 606¼ brace showed that, notwithstanding the presence of a large number of workmen, the grouse were not seriously interfered with. The other side had exaggerated the damage in regard to shooting; and it would be for the Umpire to consider what the real permanent damage was. Witnesses would be called who would say that it was certainly not more than £10 per annum, or, at 25 years' purchase, £250; and his contention was that if Lord Carlisle had £400, he would get enough. Putting all the items together, the Corporation were prepared to offer £2401 5s., which they said was all the compensation that should be paid Lord Carlisle. The other claims were absolutely ridiculous. Coming, finally, to the question of the water, Counsel declared that Lord Carlisle was not entitled to a single penny. He had no better right to the water on the surface than anyone else lower down the stream. When it was percolating underground, he could do anything with his land; and in doing so could divert water, because no one had any property in it any more than he had. But when it appeared as springs, or was collected on the surface in a stream, he had no right to divert it at all, because everybody, all the way down the stream, had a right to the water undiminished in quantity.

The first witness for the Corporation was Mr. E. L. Mansergh, M.Inst.C.E., the Engineer for the Geltsdale scheme. He stated that in no case would the Carlisle Corporation take underground water, or do anything that would prevent Lord Carlisle digging or trenching behind any of the springs; nor did they deprive him of any of his rights. With regard to Newcastle, which was in an altogether different watershed, it was too ridiculous to assume that it might wish to get the Gelt water. It was shown in 1894 that the town then had water enough for 38 years in their control at that time. Assuming it was found that, for some reason, such as the quicker growth of population, they had now only enough for 20 years, there was plenty of water available in their present area for 120 or 130 years.

Mr. Charles Hawksley, M.Inst.C.E., said in the case of a reservoir which his firm had just completed, the Company, in order to reach it, made 19 miles of railway across a farm and a moor at the foot of the Cheviots. It went through the farm of one of the best known breeders of Cheviot sheep. At first they were a little alarmed at the locomotive; but they became so accustomed to it that they would lie on the line. Witness added, with relation to the disturbance of game, that grouse behaved in very much the same way. Concerning the possible competition of Newcastle for the Geltsdale water, he explained that his firm were Advising Engineers for the Company, and expressed the conviction that such a scheme was out of the question.

The next witness was Mr. Henson, of the firm of Messrs. Abbey and Henson, who stated that Lord Carlisle's right to intercept and collect the water on the estate would be in no way interfered with; and therefore he did not sustain any loss. He was followed by Mr. Punchard, who has for forty years been agent for the estate, consisting of 35,000 acres, of the late Earl of Bective. He expressed the opinion that the

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Windsor St. Works, Birmingham	2,000,000	Winnipeg, Man.	500,000	Leeds	1,800,000
Saltley Works, Birmingham	2,000,000	Colchester (Second Contract)	300,000	Malton	150,000
Colchester	300,000	York	750,000	Smethwick	500,000
Birkenhead	2,250,000	Rochester	500,000	Gravesend	300,000
Swindon (New Swindon Gas Co.)	120,000	Kingston, Ont.	300,000	Pernambuco, Brazil	125,000
Saltley, Birmingham (Second Contract)	2,000,000	Crystal Palace District	2,000,000	Duluth, (Second Contract)	300,000
Windsor St., Birmingham (Second Contract)	2,000,000	Duluth, Minn.	300,000	Leicester (Second Contract)	1,000,000
Halifax	1,000,000	Caterham	150,000	Newport (Second Conttract)	250,000
Toronto	250,000	Leicester	2,000,000	Brockville	250,000
Ottawa	250,000	Enschede, Holland	150,000	Toronto (Third Contract)	750,000
Lindsay (Remodelled)	125,000	Buenos Ayres (River Plate Co.)	700,000	Montreal, Ont. (Second Con.)	1,800,000
Montreal	500,000	Burnley	1,500,000	Toronto (Fourth Contract)	1,000,000
Toronto (2nd Cont., Remodelled)	2,000,000	Kingston-on-Thames	1,750,000	Hamilton, Ont.	400,000
Belleville	250,000	Accrington	500,000	Rochester (Third Contract)	1,600,000
Ottawa (Second Contract)	250,000	Tonbridge	300,000	Leeds (Second Contract)	900,000
Brantford (Remodelled)	200,000	Stretford	500,000	Buenos Ayres (Primitiva Co.)	1,200,000
St. Catherines (Remodelled)	250,000	Oldbury	300,000	Buenos Ayres (New Co.)	1,200,000
Kingston, Pa.	125,000	Todmorden	500,000	Christchurch, N.Z.	300,000
Peterborough, Ont.	250,000	Saltley, Birmingham (Third Contract)	2,000,000	Rochdale	1,600,000
Wilkesbarre, Pa.	750,000	York (Second Contract)	750,000	St. John's, Newfoundland	250,000
St. Catherines (Second Cont.)	250,000	Rochester (Second Contract)	500,000	Brantford (Second Contract)	400,000
		Newport (Mon.)	250,000	Smethwick (Second Contract)	500,000
		Tokio, Japan	1,000,000	Pontypridd	250,000
				Montreal (Third Contract)	1,800,000

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permanent depreciation of the Geltsdale Estate by the works of the Corporation, when completed, would be practically non-existent. The Corporation would probably exercise their rights in a reasonable manner. Mr. John Armstrong, of Messrs. D. & R. Armstrong, said that if Lord Carlisle's rights and powers were left, at the completion of the works, the same as they were before, no compensation should be given.

Other evidence having been given, Mr. Balfour Browne summed up the case for the Corporation, and called the Umpire's attention to certain points in connection with the claim which he submitted could not be sustained.

Mr. Fitzgerald, replying on the whole case on behalf of the claimant, contended that the entire claim was a legitimate one, and one that had not been put at too high a figure. Dealing with the main question—that of the water—he said the point was not so much its sale as the depreciation in the value of the estate resulting from the destruction of the element of value that now existed and made it a water-bearing estate. This had been his claim all through. He quoted a large number of decided cases in support of his contention that water-bearing had a value distinct from non-water-bearing land, and submitted that this value had to be taken into consideration.

The proceedings then closed; and the award will be made in due course.

A SCARE AS TO EDINBURGH WATER.

Widespread interest has been taken in a scare which was sprung upon the community of Edinburgh a short time ago by a local newspaper, to the effect that there were fleas in the city water supply. The subject had been under consideration for some time; and the services of Dr. A. M. Williamson, the Chief Sanitary Inspector for the City, were called in to investigate it. His report was recently submitted to a joint meeting of the Fire Brigade Sub-Committee of the Town Council and a Sub-Committee of the Water Trust.

In the course of his report, Dr. Williamson said that he called in the aid of an expert—Dr. Traquair, the Keeper of the Natural History Department of the Royal Scottish Museum—who identified the insects as "Springtails," an insect entirely different from the water flea. The all-important facts were at once determined that the insect was harmless, was not an aquatic, and was, therefore, not introduced into the city through the water supply. More than 7000 cisterns were examined, and in only 41 were they found, and in the worst cases the insects occupied a surface equal in area to about a sixpenny piece. In no instance had their presence been detected in water drawn from a tap. A large number of hydrants of the valve type were examined, and careful scrutiny failed to detect any in that pattern. An entirely different set of conditions was, however, found when an examination was made of the ball hydrants. Of these, 30 per cent. were found faulty. During the whole of his examination, Dr. Williamson said he was impressed by the fact that no amount of attention paid to the cleaning of the hydrant boxes containing the hydrants of the ball type could be expected to prevent the objectionable contents of these boxes from periodically gaining access to the mains of the city water supply. It was apparent that after a heavy shower of rain a large quantity of material representing washings from the roadway found its way into the boxes, and thence directly into the water supply the moment the pressure was lowered in the slightest degree. His observations, he said, led him to conclude that this type of hydrant implied great danger from a public health point of view; and so long as it remained in use, he could not imagine that the strictest attention, so far as cleansing was concerned, or any other precaution which could be taken, would suffice to safeguard the purity of the water supply. He therefore recommended the substitution of the valve hydrant for the ball type; and, pending the completion of these, he suggested that some mechanical apparatus should at once be adapted to the existing ball hydrants, so as effectually to prevent any possibility of contamination. Mr. W. Evans, F.R.S.E., of Edinburgh, corroborating Dr. Traquair's opinion, said that the insects might be regarded as scavengers, and as beneficial rather than otherwise.

The Joint Committee sat for nearly two hours. They expressed the opinion that they were satisfied there was no cause for alarm; there being no danger whatever to public health. But the fact of the possibility of these insects, though harmless in themselves, finding their way from the hydrants into the water supply, necessitated their taking steps to prevent the possibility. There were in the city at present 2300 ball hydrants, and of these it would be possible to remove and disconnect at once perhaps 500, leaving 1800 still in use. For the past ten years the process of substituting the valve hydrant for the ball hydrant had been going on—about 700 having been replaced; and the Committee felt that all that was required to meet recent apprehensions was to accelerate the present system of replacing them. As a temporary expedient while this was being done, the question of making safe from all risk of contamination from the ball hydrant was discussed; and the question of fitting these with stoppers was considered. It was unanimously agreed to have those of the most approved type put on. Several specimens were on exhibition at the meeting, and the Committee selected one. The resolution come to by the meeting was—"That the present system of replacing existing ball hydrants by valve hydrants be accelerated, so as to complete the replacement in a period of about six years; and, meantime, to at once place on all ball hydrants stoppers of the best mechanical type.

The bursting of a 36-inch water-main which connects the Audenshaw reservoirs with Manchester, caused a good deal of inconvenience on Monday of last week in Hyde Road. Numerous cellars were flooded; and the keeper of a general store had some of his stock washed away by the flood. The cause of the burst—which extended right along a 12-feet section—is not definitely known.

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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

To-night the Western District of the Scottish Junior Gas Association concluded the literary portion of their session, by a meeting held in the usual place in Glasgow. They have now only one event on their programme—a visit to an iron and steel works. During the session they have held six meetings in Glasgow, and have, in addition, visited two gas-works, a fire-clay works, and a chemical works. The subjects discussed have been varied and interesting, and the discussions upon the papers even have been more interesting than the papers themselves, which testifies to the talent of the general body of the members. In addition, the attendances at all the meetings, without exception, have been very good. Taken all in all, the session which is just closing has been one of great credit to the Association. Those who have had charge of its affairs during the past six months of activity have every reason to be proud of, as they are entitled to be congratulated upon, their achievements. The meeting to-night had its attention directed to the two very differing subjects of gas accounts and retort-settings—the one appealing to the man in the office, the other to the man in the works.

In the paper on gas accounts, Mr. J. Mann, who belongs to the Gas Department, gave a very lucid account of the method adopted by the Corporation of Glasgow in dealing with their accounts. The field covered was a wide one, ranging from the form of transfer of the whole concern to the form of transfer of individual annuities, with, between, full descriptions of the keeping of the working accounts of the undertaking in both works and counting-house. With such a vast experience in the keeping of accounts and the stating of them so as to be clear and comprehensible, an exposition from the office of the Glasgow Corporation Gas Department was certain to contain many things a knowledge of which will be to the benefit of the officials of undertakings of less magnitude; and Mr. Mann discharged his duty in a way which was at once simple and comprehensive. The paper, being a narrative of facts, could not be discussed; and the discussion which took place was not upon it, but upon abstract questions arising out of it. This was chiefly upon the question of depreciation, which is legislative before it is administrative, and with reference to which the varying opinions expressed can have little other effect than assisting to form an intelligent opinion, the outcome of which may be the arrival at a more settled practice in this much-debated matter.

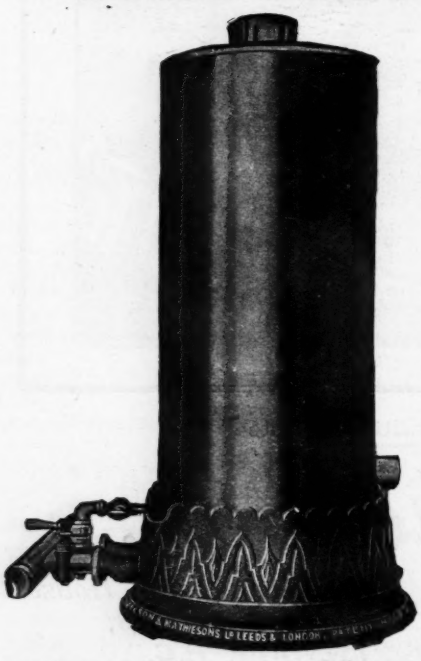
The paper on retort-settings by Mr. R. W. Cowie, the Manager of the gas-works belonging to the Local Authority of Lockerbie, was of an ability quite out of proportion to anything which he could have learned in his present situation; but it is to be remembered that he was in the employment of the Glasgow Corporation, and we must conclude that this intimacy with the setting of regenerative retort-benches was largely acquired during that period of his service. He gave an account which, as was said, picked out all the important points in retort-setting, and was yet far from being overburdened with details. This method of handling the subject accorded with the taste of the meeting; and the result was a nice gossipy discussion, in which, as the President requested, personal experiences were given. But again the discussion was not upon the subject of the paper, but upon the working of retort-settings. Altogether, the evening was a well-spent one; and it is to be hoped that the members will bear in mind the injunction of the Council, announced by the President, to send in early intimation of papers to be read next session, so that interest in the Association may be kept up.

I read with some surprise in the Dundee newspaper of Monday last an account of a visit by the Eastern Branch of the Scottish Junior Gas Engineers' Association to the Dundee Corporation Gas-Works. At the last meeting of the Eastern District in Edinburgh, at which a description of the retort-settings in the Dundee works was given by Mr. W. Mitchell, the general foreman in the works, the President said he was sure it would be a pleasure to them to pay a visit to the works there next session, and Mr. Mitchell assented. The visitors last Saturday were received by Mr. A Yuill, the Engineer, and were shown round by him and his assistants. They were afterwards entertained to tea, and Mr. J. Simpson, of Inverkeithing, on behalf of the Association, thanked Mr. Yuill for the interest he had taken in the welfare of the Junior Association, and said it had been a great pleasure for them to have had the privilege of viewing the Dundee Gas-Works, which were thoroughly up to date. Mr. A. M. Fyffe, engineering assistant, who presided, assured the members that they had a staunch friend in Mr. Yuill; and he could tell them, from his own experience, that no manager could possibly give more help and consideration to the younger engineers than Mr. Yuill did. There must be some mistake in this matter. The visit was not on the programme for this session, and a leading member of the Eastern District informs me that he knew nothing about it. The visit must have been a private one. But how did it come to be regarded as a visit of the Eastern District? No one can have any complaint to make as to the right of Mr. Yuill to show his works to anyone, or his generosity in allowing it, or of the wisdom of any junior, or even senior, taking advantage of the opportunity of seeing works of the quality of those in Dundee; but when an official visit was in contemplation, it is questionable taste on the part of any section of the Association to forestall it. The effect will certainly be to spoil the visit of the Association next winter, should it ever be arranged for now.

The Corporation of Dumfries agreed last week to increase the fire insurance over their gas-works to £16,810, the premium to be at the rate of 1s. 6d. per cent., and to amount to £12 12s. 3d. yearly. It was reported that sixty-four applications for the post of works foreman had been received, and that the Manager had reduced the list to nine. A Committee was appointed to make the appointment. The Gas Committee reported that they had considered a report by the Manager—Mr J. Malam—recommending an increase of retorts to the number of 24, and that they had agreed that consideration of the recommendation

HOT WATER THROUGHOUT THE HOUSE DURING THE SUMMER WITHOUT LIGHTING THE COAL FIRE BY THE WILSON

"CIRCULATOR" WATER HEATER.



This Heater is to be attached to the water pipes between the Kitchen Boiler and the Hot Water Cistern or Cylinder, and can be fixed in any convenient position in the Kitchen, Bathroom, &c., so that it is below the Cistern or Cylinder, and the result of its use is to heat the water in the Cistern or Cylinder by circulation the same as the coal fire; it does not interfere with the use of the coal fire boiler; either can be used separately, or both together if an extra quantity of hot water is required.

The advantages of the "Circulator" are—hot water can be obtained in **Hot Weather** without the coal fire, and in **Cold Weather**, by leaving the smaller burner alight during night when the fire has gone out, hot water is available in the early morning.

In ordinary use during hot weather about 100 feet of gas (costing from 2½d. to 4d., according to price of gas) will give 50 gallons of hot water, and we suggest that the smaller burner, consuming about 10 feet per hour, be used for 10 hours each day.

It is constructed throughout of strong copper, tinned inside with pure tin. The cast-iron stand is fitted with a double concentric burner, the larger one to be used to heat the water quickly, and the smaller one for use during the day to maintain the constant supply of hot water.

Size of the "Circulator" over all—**9** inches diameter, **20** inches high to top of socket. The brass sockets are for ¾-inch iron pipe.

PRICE complete (as engraved) with Stand, Double Concentric Burner, and Tray,

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be delayed till the end of the year. After some discussion, the Council, by 12 votes to 11, agreed to the Committee's recommendation.

At a recent meeting of the Greenock Corporation, the Gas Committee reported that they had had before them a report by a Sub-Committee upon the report of the Manager—Mr. W. Ewing—dated April 6, 1905, upon proposed extensions of plant at the gas-works. The Sub-Committee recommended (1) that the erection of four through arches for 64 retorts be proceeded with; (2) that an exhauster of the best modern type be procured; (3) that the Manager be instructed to obtain information as to the newest and best types of scrubbing and purifying plant; and (4) that a deputation be appointed to visit several other towns, before coming to a decision with regard to the purifiers. The recommendation was sent on to the Town Council, where it was mentioned that it would entail an expenditure of fully £4000; but that the Gas Committee felt it to be impossible to face an increased consumption of gas next winter unless they got authority now to go on with the work. After a discussion, the recommendation was adopted. The deputation have already started their labours, for they have been to see the works of the Edinburgh and Leith Gas Commissioners at Granton and the gas-works at Dundee.

The lighting of the Volunteer Drill Hall in Dundee has just been converted from a scheme in which flat-flame gas-burners were used into one with incandescent gas-lamps; the work having been done under the supervision of Mr. A. Yuill, the Gas Engineer to the Corporation. By the old system, the light given was 3650 candles, and the cost per 100 hours was £9 16s. 9d. By the new system, the light is equal to 12,000 candles, and the cost is £5 19s. 6d. per 100 hours.

A public meeting was held in Uddingston on the evening of Thursday of last week, for the purpose of considering alleged grievances of gas consumers. The Lesser Public Hall was crowded. County Councillor T. F. Wilson, the Chairman, explained that the object of the meeting was to express indignation at the extraordinary increase that had taken place in the totals of the gas accounts for the past quarter, also at the poor quality of the gas that had been supplied for some considerable time. He was not in favour of indignation meetings, but in this instance he felt that there was a distinct grievance, otherwise he would not have been a party to such a meeting. The grievance was pretty general all over the place; and he thought the attendance that evening was ample justification for their having been brought together. After a discussion, a strong Committee was appointed to wait upon the Directors, asking for a revision of the past quarter's accounts, a better light, and reduced charges. Now, I am in a position to state that the agitation is almost the work of one man—Mr. Turner. If there be any increase in gas bills, it is due to the putting in of a larger gas-main than before, with the result that some people have been getting more gas than formerly. But even this scarcely raises the subject to the height of importance to which it has been elevated.

The Directors of the St. Andrews Gas Company announce a reduction, as from the February quarter, of 5d. per 1000 cubic feet in the price of gas used for power purposes; thus making the net charge 2s. 11d. in place of 3s. 4d., as at present, for cash in one month from the date of taking the index.

CURRENT SALES OF GAS PRODUCTS.

Week ending March 10.

The quiet time in the London market continues; but prices are steady, makers being well sold in most articles for some way ahead. The inquiry for pitch is good, and prices should improve. Crude carbolic acid, 60°, is from 1s. 9½d. to 1s. 10d. per gallon net, according to position; and 90 per cent. benzol is from 9¾d. to 10d. net. Ordinary creosote is firmer, and business has been done at over 1⅞d. net in bulk. Sulphate of ammonia is still a little better, and the price obtainable for prompt and over the next month or two is from £12 10s. to £12 11s. 3d. on Beckton terms; but it is doubtful if makers would sell at such figures.

LIVERPOOL, *March* 10.

Sulphate of Ammonia.

The improvement in the market recorded last week has been maintained, and in Scotland there has been a further advance in values; but demand has not been sufficient to effect a further improvement at other points. Probably the publication of the figures for February, showing a serious decline in exports, has somewhat damped the ardour of buyers for the time being. The closing quotations are £12 5s. per ton f.o.b. Hull, £12 6s. 3d. to £12 7s. 6d. per ton f.o.b. Liverpool, and £12 10s. per ton f.o.b. Leith. Home demand, it may be noted, has been very satisfactory. There has been large inquiry in the forward position, but the advanced views of makers have put a check upon business. Speculators, who were recently selling abroad at the equivalent of £12 2s. 6d. per ton f.o.b. summer-autumn months, and July-September at the equivalent of £12 per ton, have withdrawn from the field, and seem now to be concerned about covering their sales.

Nitrate of Soda.

This article is very firm; and spot prices are 11s. 3d. to 11s. 6d. per cwt., according to quality.

LONDON, *March* 10.

Tar Products.

There has been a fair amount of business doing during the past week, though, as a rule, prices still have a downward tendency. In pitch the depression still continues for early delivery, and prices are decidedly weaker. The largest London makers still decline to sell at the quotations mentioned by dealers, but there are evidently second-hand sellers at under 29s.; in fact, business is reported at 28s. for May-June. On the East Coast, a fair business has been done at 27s. for March-June; but even at this price buyers are not particularly anxious to purchase. The demand on the Continent is very dull indeed; and though there is a very good inquiry from South Wales, yet the prices offered by buyers certainly do not tempt manufacturers

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For Prices and full Particulars, apply to the

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to sell. In Lancashire, the market still continues very dull, and several parcels have been sold for prompt delivery at a low figure. In anthracene, there is reported to be a little more inquiry for forward delivery; but business does not appear to have resulted, as manufacturers are quite indifferent to forward business at anything like existing prices. Benzol is decidedly easier; and though there has been a fair business doing in 90 per cent., yet prices are certainly lower all round, especially at outports in the North. The demand for toluol is very good indeed, especially for early delivery; but there is practically nothing offering, and prices are purely nominal. Solvent naphtha is still very scarce, especially for delivery during the present month; and business is reported at very good prices for small quantities for home consumption. There is certainly, however, an easier tone so far as forward delivery is concerned; and it is not apparently expected that the present strong demand will be maintained. There is more business doing in the special qualities, for which fairly high prices have been paid. In carbolic acid, the market appears still steady at 1s. 9½d. for 60's; while business is reported in 75's at 2s. 2d., and in 50's at from 1s. 6d. to 1s. 7d. One manufacturer reports business in 60's at 1s. 10d. for July-December; but this is rather over the price consumers appear at present prepared to pay. The market in crystals continues quiet. It is reported that a considerable quantity has been placed for shipment to Russia. English makers are now prepared to accept 6d. for 39-40 per cent.; but they are not offering any quantity even at this price. Creosote continues quiet, and there is very little doing. London makers are, however, fully sold for prompt delivery; and so far as forward is concerned, they do not care to sell at existing prices, as they have still strong hopes that there will be an improved demand from America during the winter months. In Yorkshire, business has been done at under 1½d. for March-June delivery; while Lancashire makers report having accepted slightly under 1½d. over the same period.

The average values during the week were: Tar, 17s. to 21s. Pitch, London, 28s.; east coast, 27s. to 27s. 3d.; west coast, 25s. to 25s. 6d. Benzol, 90 per cent., 9½d.; 50-90 per cent., 10½d to 10⅝d. Toluol, 1s. 0½d. to 1s. 1d. Crude naphtha, 4½d.; solvent naphtha, 1s. 1d. to 1s. 1½d.; heavy naphtha, 11½d. to 1s. Creosote, London, 1⅜d. to 1⅝d.; North, 1⅜d. to $1\frac{7}{16}$d. Heavy oils, 2¼d. Carbolic acid, 60 per cent., 1s. 9½d. Refined naphthalene, £4 10s. to £8 10s.; salts, 20s. to 21s. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market closes with a fairly steady tone; and though there is not very much business doing, yet there appears to be a good deal of inquiry, especially for forward delivery. Beckton's nominal price may be taken as about £12 12s. 6d. for March-June; but they are not particularly anxious to sell even at this figure, which, however, is certainly a little over buyers' ideas. In Leith, small sales have been made at £12 7s. 6d. for prompt; but business is reported for April-September delivery at £12 10s. In Liverpool, the market was very firm early in the week, and sales were reported at £12 6s. 3d. Since then prices have been decidedly easier, and the value cannot now be taken as over £12 5s. In fact, it is not easy to obtain this for prompt delivery. In Hull, sales were made early in the week at £12 6s. 3d.; but later on £12 5s. was accepted for a fair quantity for early shipment.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Notwithstanding the advance of spring, the demand for house coal has rather increased than diminished; but, of course, it cannot naturally continue for long. The requirements for trade purposes forms a strong feature in the coal market; so much so for slack, that colliery proprietors are building up stocks for the summer months, in order to be able to fulfil the requirements of those who have contracted for this class of coal for the year. The call for gas coal and cannel is decreasing, owing to the growing length of the days; but the prospects of gas producers in the coming autumn and winter are more favourable than ever. So far as can be judged at present, more of this class of coal will be required during the near future. The battle of the new contracts will be fought out on the Exchange or by tender. A lull just now characterizes the coke market; but it is believed to be only of a temporary nature. Coal for shipping continues a satisfactory feature. Prices are practically unchanged. No meeting appears to have been held by the Coal Conciliation Board in the matter of the application of the masters for a 5 per cent. reduction in wages. A meeting of the miners' section of the Board for the Federated mining districts in England and North Wales was, however, held in London last week, to consider the wages question, and to determine whether an application should be made for an advance; and it was decided that the Secretary should communicate with the Secretary of the Coalowners' Section asking for an informal meeting of the Board to be called to consider the proposal. There are some members of the Manchester Coal Exchange who consider the time ripe for an advance, and others who are of a contrary opinion.

Northern Coal Trade.

There is a better demand for coals, and the prices of some classes are higher. On the other hand, the consumption is beginning to show the effect of the longer days and of milder weather. Steam coals are in brisker demand—best Northumbrians being from about 9s. 9d. to 10s. per ton f.o.b., second-class steams are 9s. to 9s. 3d., and steam smalls are rather scarce and firm at 6s. In the gas coal trade, the prices range from about 8s. 10d. to 9s. 10d. per ton f.o.b. for occasional cargoes; and the demand is fairly good. There are now close negotiations in the contracts for the London Gas Companies; and there are rumours that one or two of these contracts have been entered into at an advanced price—the exact figure not being stated with any definiteness. Looking to the contracts already made, the chief point at issue is the extent of the advance which the position of the market may secure. Probably in a week or so, some official statement may enable

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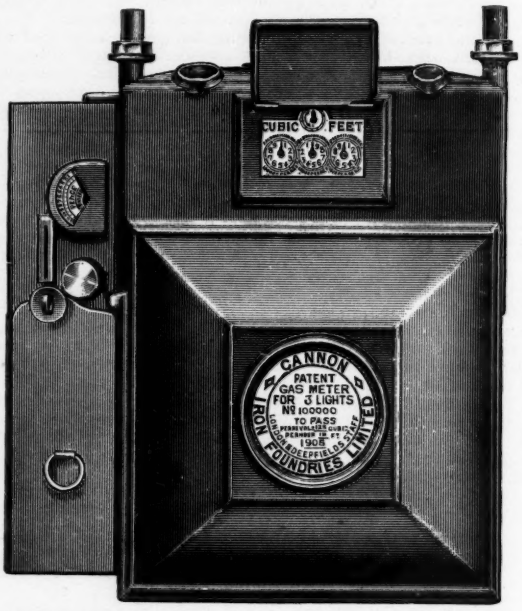

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an accurate idea of the prices to be formed. Coke is quieter, and gas coke does not show much change—companies which can ship gas coke obtaining fair prices, while inland producing companies have stocks of moment in some cases.

Scotch Coal Trade.

Trade is steady; the demand for splint being the weakest. This variety was reduced 6d. per ton, at the pit-head, as from the 1st inst.; and the supply of it is plentiful. Other sorts are in good demand, particularly ell. There is a strong demand for all the smaller sorts. The prices quoted are: Main 7s. 9d. to 8s. per ton f.o.b. Glasgow, ell 8s. 9d. to 9s. 6d., and splint 9s. 3d. to 9s. 6d. The shipments for the week amounted to 226,129 tons—a decrease of 12,428 tons upon the preceding week, but an increase of 2381 tons upon the same week of last year. For the year to date, the total shipments have been 1,975,043 tons—an increase of 27,974 tons upon the corresponding period of 1905.

Local Authorities and the South Suburban Gas Bill.

At the Meeting of the Camberwell Borough Council last Wednesday, a letter was submitted from Sir George Livesey, in reference to the South Suburban Gas Company's Bill, asking whether it was necessary for the Council to spend a further large sum of money on a parliamentary contest, and stating that the Company's costs during the last three sessions on this Bill had amounted to over £8000, of which eight-ninths had been borne by the consumers of gas, in addition to the costs of the Local Authority. The writer pointed out that if the Bill had been allowed to pass in its entirety, the price of gas would now have been 2d. per 1000 cubic feet lower than it is. With the incandescent mantle, the nominal illuminating power of gas is of no consequence whatever; but as long as a high nominal standard of light was insisted upon, the use of gas for all other purposes, especially as a fuel, would be restricted. The whole of the saving from the abolition of enrichment of the gas would go the consumers; the Company being ready and willing to forego all pecuniary advantage. The advantage to them will consist in the freedom to adapt the supply of gas to the requirements of the public. The communication was referred to a Committee for consideration and report.

Sales of Stocks and Shares.

At the Mart, Tokenhouse Yard, last Tuesday, Mr. Alfred Richards conducted a successful sale of gas and water stocks and shares. It included two new issues, by order of Directors. The first consisted of 2500 £10 shares of the Alliance and Dublin Consumers' Gas Company, ranking for a standard dividend of 7 per cent., subject to the sliding-scale; the dividends on similar shares in the Company having been paid since 1884 at the rate of 7½ per cent. per annum. The shares were all sold at from £14 12s. 6d. to £15 each, with dividend as from the 1st prox. The other new issue was made by the Tendring Hundred Water Company, who offered 200 £10 "A" shares, ranking for a maximum dividend of 8 per cent., but carrying 4½ per cent. as from the 1st prox. They were all placed at £10 5s. to £10 7s. 6d. each. On the same occasion, Mr. Richards sold some consolidated stock of the Hornsey Gas Company, carrying dividend at the rate of 9½ per cent. per annum, at from £202 to £203 per £100 of stock; and some 5 per cent. preference stock at £123 per £100. A small parcel of £10 fully-paid original shares in the Ceará Gas Company, Limited, on which for the past two years dividends at the rate of 5 per cent. per annum (free of income-tax) have been paid, fetched £4 to £4 5s. per share. On the same day, at the Mart, Messrs. Chancellor and Sons sold £500 of consolidated ordinary stock of the Richmond Gas Company for £650, or an average of £130 per £100. Some £5 shares in the Sandy Gas Company have been sold at prices ranging from £7 2s. 6d. to £7 12s. 6d. each. At a local auction sale, £1285 of consolidated ordinary stock in the Gloucester Gas Company realized from £116 10s. to £118 15s. per £100.

Lower Price for Gas for Power and Manufacturing Purposes in Manchester.

At last week's Meeting of the Manchester City Council, Alderman Gibson proposed the adoption of the recommendations of the Gas Committee regarding the price of gas for engine and manufacturing purposes which were given in the "JOURNAL" a fortnight ago (p. 604). The Committee proposed a reduction in the price of gas supplied for engines by 3d. per 1000 cubic feet—*i.e.*, from 2s. to 1s. 9d. within the city, and from 2s. 3d. to 2s. beyond the city; also that the Committee should be empowered to receive and consider applications from consumers who use gas for manufacturing purposes only, and fix the price at which gas so used shall be charged. Alderman Gibson asked the Council to give the Committee the opportunity of experimenting in these matters for twelve months, at the cost of about £5000 in each case. The Committee hoped by the reductions to very much increase the consumption. His own feeling would be to reduce the price of gas all round; but this would mean nearly £50,000 a year. If they did this what would become of the £50,000 contributed in relief of the rates? So long as the Corporation took this sum of money out of the pockets of the Gas Committee, they were handicapped in doing what they would otherwise be able to do. The recommendations were agreed to.

Referring to the above decision, a correspondent writes: "As a Manchester man knowing the surroundings, I am certain that if the Gas Committee would go a step farther and reduce the price to gas-fires by a similar amount, a remarkable impetus would be given to this class of consumption, and the smoke nuisance, which is chiefly caused by the emissions from domestic and office chimneys, would be greatly reduced, to the satisfaction of the Sanitary Committee and the profit of the Gas Committee."

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A Danger Attending Railway Carriage Lighting by Gas.

The report made to the Board of Trade by Lieutenant-Colonel von Donop, regarding an accident by which a Great Central train was derailed in the Catesby tunnel, near Rugby, after stating that the accident (in connection with which none of the 50 or 60 passengers was injured) was caused by a broken rail, draws attention in the following terms to the lighting of railway carriages by gas: "One other point in connection with this accident calls for mention. Three of the vehicles of the train were lighted by gas. All the lights in these vehicles were at once extinguished by the derailment; and there was, in consequence, a great escape of gas. Fortunately, the officials of the Company who were travelling in the train noticed the smell; and they at once took prompt measures to keep all naked lights away from these vehicles. Danger was thereby averted; but it is terrible to contemplate what might have been the results of this accident if an explosion had occurred or a carriage had caught fire in the tunnel. The leading and rear vehicles of the train were both lighted by electricity. The lights in the latter were extinguished; but in the former vehicle they remained alight throughout, and were of the greatest assistance in rescuing and controlling the passengers. This accident furnishes, therefore, another instance showing the undesirability of the employment of gas as an illuminant for trains, and the superiority of electricity for that purpose."

A Substantial Reduction at Conway.—Among the matters recently considered by the Conway Town Council was a report by Mr. Hugh Parry, the Borough Accountant, that in the year ended March 31 there was a profit of £243 on the gas undertaking, and it was hoped that there would be a similar surplus this year. The accumulated profits on the undertaking last March amounted to £1472. He advised that the price of gas be reduced by 5½d. per 1000 cubic feet for lighting purposes and by 3d. for heating—making an all-round price of 3s. 6d. per 1000 cubic feet, with 5 per cent. discount for prompt cash. The suggestion was adopted.

Electric Lighting v. Gas in Islington.—A long discussion took place at the meeting of the Islington Borough Council on the 2nd inst., on a recommendation by the Lighting Committee that arc lamps should be extended to 15 miles of streets at present lighted by some 714 gas-lamps, which it was proposed to supersede by 245 arc lamps at a cost of £21,011. Strong opposition was offered to the project by a number of the members, who contended that the figures upon which the recommendation was based were supplied by the Electrical Engineer. In the result, 14 voted to refer the matter back to the Committee; but eventually the recommendation was carried.

A Surcharge at Accrington.—The members of the Accrington District Gas and Water Board have lately been in correspondence with the Local Government Board, with reference to the action of the latter's Auditor in surcharging them with an amount of £30 paid for income-tax on the salary of their General Manager (Mr. Charles Harrison). When Mr. Harrison was in the service of the old Gas and Water Company, his income-tax was paid for him; and when the works were taken over by the Board, the practice was continued. In 1901, his salary was raised by £100, from £500 to £600, and no mention was made of the inclusion in this amount of the various emoluments he had hitherto enjoyed—it being the purpose of the Board to increase his salary and emoluments by £100 a year. The Board therefore continued to pay the income-tax without question until last year, when the surcharge was made—in consequence, it is stated, of a member of the Board calling the attention of the Auditor to the matter. The Board, on being thus surcharged, decided to pay Mr. Harrison an inclusive salary, so as to obviate trouble in the future; and they petitioned the Local Government Board to remit the surcharge on the present occasion. The Local Government Board, after asking for evidence of the salary and emoluments to which Mr. Harrison was entitled under the Gas and Water Company, and a copy of the resolution of the Council by which his salary was raised £100 a year, have agreed to this course; and hence the members are freed from the surcharge.

San Paulo Gas Company.—The report which will be submitted at the annual meeting of the San Paulo Gas Company on the 19th inst. states that the revenue account shows a profit on the working for the year ending Dec. 31 of £29,783, to which has to be added the balance brought forward, £3399, making a total of £33,182. Deducting £4512 interest on debentures and provision for debenture redemption, there remains a disposable balance of £28,670. An interim dividend of 3 per cent., absorbing £7500, was paid in September; and the Directors, after transferring £5000 to reserve account, recommend the payment of a final dividend of 5 per cent., free of income-tax, which will absorb £12,500—making a distribution of 8 per cent. for the year, and leaving a balance of £3670 to be carried forward. The average rate of exchange for the past year was 15·718d., as compared with 12·156d. in 1904. The revenue account has been converted into sterling at 15¾d. per milreis. The assets and liabilities of the Company in Brazil on Dec. 31 have been valued at 16¼d., as against 13½d. at the end of 1904. The increase in the value of the assets resulting from the higher rate of exchange amounts to £3702, which has been carried to exchange account. The Company's Manager and Engineer in San Paulo report that the works and plant had been maintained in good order and repair. Considerable progress has been made during the year with the improvements at the works referred to in the last report. The public lighting of the streets has been carried out to the entire satisfaction of the authorities. The consumption of gas by the private consumers, both for lighting and cooking purposes, continues to show a gratifying increase.

The £20,000 of new capital required by the Gosport Water-Works Company, for their new works at Soberton, has been subscribed for to the amount of upwards of £60,000. The terms were 10s. premium on every £10 of stock; and the dividend is to be 5 per cent. per annum.

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"ACME" WORKS,
BIRMINGHAM.

The annual general meeting of the Shanghai Water-Works Company, Limited, will be held in Shanghai on the 28th inst., when a dividend of 37s. 6d. per share will be recommended.

More cases of lead poisoning from the water supply to Mossley having come to light, the matter has been discussed in the Town Council, and a resolution passed to ask for an inquiry.

Mr. W. Bryant, who has for many years been a Director, and for some time the Deputy-Chairman, of the Maidstone Gas Company, was the recipient, on the occasion of his golden wedding, on the 4th inst., of an illuminated address and a silver salver from the officials of the Company. The address, which was illustrated with four photographic views of the works, expressed the recognition by the officials of the interest and kindly feeling which Mr. Bryant had always extended towards them.

We are informed that Messrs. Richard Hornsby and Sons, Limited, of Grantham, who are well known as makers of oil-engines, have just added the manufacture of gas-engines and suction-gas plants, and have secured the old-established business of Messrs. J. E. H. Andrew and Co., Limited, of Stockport. We understand that the Chairman and the Managing-Director of the latter Company have joined the Board of Messrs. Hornsby, and that Mr. Bellamy retains the management of the Stockport branch works. Grantham remains the headquarters of the enlarged business.

Messrs. F. C. Sugden and Co. have had placed with them repeat orders for regenerator settings and ironwork by the Blaenavon Gas and Water Company, Limited, the Kirkburton Gas Company, Limited, and the Parish of Birmingham.

The Directors of Messrs. Stewarts and Lloyds, Limited, after setting aside £40,000 for depreciation, recommend a dividend for the half year ended Dec. 31 at the rate of 11 per cent. per annum on the ordinary shares; and after placing £25,000 to the reserve, they carry forward £57,000.

At the annual meeting of the Richmond Gas Stove and Meter Company, Limited, on Thursday, the Chairman (Mr. T. Dwerryhouse), in moving the adoption of the report, the principal features of which were given last week, said the trade of the Company was increasing to such an extent that two years ago they took a piece of land 9 acres in extent, in Grappenhall, with the intention of building another works—the present being too small to cope with the demand; and the Company hoped shortly to commence building a foundry and workshops there. Mr. H. M. Thornton (Vice-Chairman) seconded the motion. He mentioned that during the past year they had been granted the largest single contract which any works in their class of manufacture had ever obtained. They had also secured half the contracts for the supply of stoves for the Corporations of Belfast and Glasgow. The report was adopted.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

GAS ENGINEER (BRITISH COLONIES). No. 4571.
RESIDENT GENERAL FOREMAN OR WORKS MANAGER. Londonderry Gas-Works.
DISTRICT INSPECTOR. No. 4574.
LEAKAGE DETECTER, &c. No. 4570.

Situations Wanted.

INSPECTOR DISTRIBUTION DEPARTMENT. No. 4573.
PREPAYMENT METER COLLECTOR. No. 4572.
SALESMAN, BOOKKEEPER, COLLECTOR, &c. D., 18, Ferndale Avenue, Walthamstow.

Representative Wanted for High-Power Gas-Lamp,

Alexander, Burslem.

Agency Wanted. Progress, c/o Willing's.

Plant (Second-Hand), &c., for Sale.

CHEMICAL MANUFACTURING PLANT. R. M'Tear and Co., Glasgow.
ENGINE AND PUMPS, LIQUOR TANKS, &c. Whitehouse's Executors, Ilkeston.
GASHOLDERS AND TANKS. Cowdenbeath Gas Company.
RETORTS, MOUTHPIECES, ASCENSION, &c., PIPES, HYDRAULIC MAINS, FURNACE IRON WORK, AND SEAL VALVES (UNUSED). Yeadon and Guiseley Gas Company.
WALKER'S PURIFYING MACHINE. Cannock, Hednesford, and District Gas Company.

Plant, &c., Wanted.

WALL BRACKETS, GAS COCKS, &c. Mosse, Hamburg.

Company Meetings.

BRITISH GASLIGHT COMPANY. London Office, March 28 Twelve o'clock.
OTTOMAN GAS COMPANY. London Office, March 27. One o'clock.

Stocks and Shares.

BARKING GAS COMPANY. April 3.

TENDERS FOR

Coal and Cannel.

STOCKTON-ON-TEES GAS DEPARTMENT. Tenders by March 20.

Coke.

WANDSWORTH AND PUTNEY GAS COMPANY. Tenders by March 26.

Fire-Clay Goods.

LOUGHBOROUGH GAS DEPARTMENT.

Gasholder and Tank.

HYDE GAS COMPANY.

Lamps, &c.

ASTON MANOR LIGHTING DEPARTMENT. Tenders by March 22.

Meters.

LEEDS GAS DEPARTMENT. Tenders by March 26.

Oxide.

STAFFORD GAS DEPARTMENT. Tenders by March 26.

Pipes and Fittings.

LOUGHBOROUGH GAS DEPARTMENT.

Tar and Liquor.

HAWORTH GAS DEPARTMENT. Tenders by March 22.
HORLEY GAS COMPANY. Tenders by March 31.
TEIGNMOUTH GAS DEPARTMENT. Tenders by March 14.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 708.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p.c.	21⅞—22⅛	..	4 13 4
160,000	10	,,	7⅞	Do. 7 p.c.	14⅝—15⅛	..	4 16 9
200,000	5	Nov. 15	7	Bombay, Ltd.	6¾—7¼	..	4 16 7
40,000	5	,,	7	Do. New, £4 paid	4¼—5⅛	..	5 6 8
50,000	10	Mch. 9	14	Bourne- 10 p.c.	28½—29½*	+½	4 14 11
51,810	10	,,	7	mouth Gas B 7 p.c.	16⅝—17¾*	—⅛	4 0 0
53,200	10	,,	6	and Water Pref. 6 p.c.	15—16*	..	3 15 0
380,000	Stk.	Feb. 22	12½	Brentford Consolidated	262—265	..	4 14 4
300,000	,,	,,	9½	Do. New	192—197	..	4 16 5
50,000	,,	,,	5	Do. 5 p.c. Pref.	123—123⅞	..	3 16 11
206,250	,,	Dec. 14	4	Do. 4 p.c. Deb.	103—106	..	3 15 6
220,000	Stk.	Mch. 9	11½	Brighton & Hove Orig.	227—232*	+2½	4 17 0
246,320	,,	,,	8½	Do. A. Ord. Stk.	163—168*	..	4 18 3
460,000	20	Sept. 28	10	British	43—44	..	4 10 11
100,000	Stk.	Feb. 22	6	Bromley, Ord. 5 p.c.	119—122	..	4 18 4
165,700	,,	,,	4½	Do. do. 3½ p.c.	92—93	..	4 16 9
500,000	10	Oct. 13	7	Buenos Ayres (New) Ltd.	12½—13	..	5 7 8
250,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	97—99	..	4 0 10
150,000	20	Mch. 9	8½	Cagliari, Ltd.	23—25*	..	6 12 0
100,000	10	Sept. 28	10	Cape Town & Dis., Ltd.	17—17½	..	5 14 3
100,000	10	Oct. 27	4½	Do. 4½ p.c Pref.	10—10⅝	..	4 5 9
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	53—55	..	5 9 1
50,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	100—102	..	4 8 3
1,443,280	Stk.	Feb. 22	5½	Commercial 4 p.c Stk.	114—116	..	4 9 7
560,000	,,	,,	5	Do. 3½ p.c. do.	111—113	..	4 8 6
475,000	,,	Dec. 14	3	Do. 3 p.c. Deb. Stk.	84—86	..	3 9 9
800,000	Stk.	,,	6½	Continental Union, Ltd.	130—133	..	4 17 9
200,000	,,	,,	7	Do. 7 p.c Pref.	143—148	..	4 14 7
424,070	Stk.	—	5½	Derby Con. Stk.	—	..	—
55,000	,,	—	4	Do. Deb. Stk.	—	..	—
486,090	10	Jan. 25	11	European, Ltd.	22½—23⅜	+½	4 13 7
354,060	10	,,	11	Do. £7 10s. paid	16—17	..	4 17 0
15,223,235	Stk.	Feb. 8	4⅛	Gas- 4 p.c. Ord.	98½—99⅞	..	4 8 5
2,600,000	,,	,,	3⅜	light 3½ p.c. max.	88—90	+1	3 17 9
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	107—109	+1	3 13 5
4,193,975	,,	Dec. 14	3	Coke 3 p.c. Con. Deb.	88—90	..	3 6 8
258,740	Stk.	Mch. 9	5	Hastings & St. L. 3½ p.c.	98—102*	+½	4 18 0
82,500	,,	,,	6½	Do. do. 5 p.c.	121—124*	+1	5 4 10
70,000	10	Oct. 13	11	Hongkong & China, Ltd.	20—21	..	5 4 9
3,800,000	Stk.	Nov. 15	10	Imperial Continental	233—235	—1	4 5 1
473,600	Stk.	Feb. 8	3½	Do. 3½ p.c. Deb. Red.	95—97	..	3 12 2
175,242	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c.	123—128	..	4 13 9
161,000	Stk.	Feb. 22	10	Liverpool United A	234—236	..	4 4 9
718,100	Stk.	Feb. 22	7	Liverpool United B	165½—166½	..	4 4 1
306,083	,,	Dec. 29	4	L'rpool Unit'd Deb. Stk.	109—111	..	3 12 1
75,000	5	Dec. 14	5	Malta & Medn., Ltd.	4¼—4⅝	..	5 5 3
560,000	100	Oct. 2	5	Met. of 5 p.c. Deb.	103—105	..	4 15 3
350,000	100	,,	4½	Melbourne 4½ p.c. Deb.	104—160	+1	4 4 11
541,920	20	Nov. 15	3½	Monte Video, Ltd.	11⅛—12⅛	..	5 12 0
1,675,892	Stk.	Feb. 22	4½	Newc'tle & G'tesh'd Con.	107—108*	+½	4 5 8
406,425	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	98—100	..	3 10 0
15,000	10	Mch. 9	10	North Middlesex 10 p.c.	18⅛—19⅜*	..	5 2 7
52,940	1	,,	7	Do. 7 p.c.	12⅛—13⅜*	—⅛	5 3 8
300,000	Stk.	Nov. 30	8	Oriental, Ltd.	149—152	+1	5 5 3
600,000	5	Sept. 14	7	Ottoman, Ltd.	6—6⅛	..	5 7 8
398,490	5	Apl. 20	6	Primitiva Ord.	7—7⅛	..	4 0 0
796,980	5	Jan. 25	5	Do. 5 p.c. Pref.	5⅛—5⅝	—⅛	4 13 0
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
851,070	10	Oct. 13	7	River Plate Ord.	13—13⅛	+¼	5 3 8
300,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	98—100	+1	4 0 0
250,000	10	Sept. 28	8½	San Paulo, Ltd.	14—14½	+½	5 10 4
70,000	50	Jan. 2	5	Do. 5 p.c. Deb.	50—52	..	4 16 2
135,000	Stk.	Sept. 14	10	Sheffield A	244—246	..	4 1 4
209,984	,,	,,	10	Do. B	244—246	..	4 1 4
523,498	,,	,,	10	Do. C	244—246	..	4 1 4
126,100	Stk.	Aug. 31	5½	Shrewsbury Ord. 5 p.c.	110—120	..	4 11 8
70,000	10	Sept. 28	10	South African	16—17	..	5 17 8
6,250,000	Stk.	Feb. 22	5½	South Met., 4 p.c. Ord.	128—130	..	4 4 7
1,895,445	,,	Jan. 11	3	Do. 3 p.c. Deb.	88—90	+1	3 6 8
575,000	Stk.	Mch. 9	5½	S'th Suburb'n Ord. 5 p.c.	120—123*	—½	4 9 5
60,000	,,	,,	5	Do. 5 p.c. Pref.	125—130*	+½	3 16 11
112,533	,,	Jan. 11	5	Do. 5 p.c. Deb. Stk.	132—137	..	3 13 0
502,310	Stk.	Nov. 15	5	Southampton Ord.	109—112	..	4 9 3
120,000	Stk.	Mch. 9	6½	Tottenham A 5 p.c.	124—127*	..	4 18 5
363,020	,,	,,	4½	and B 3½ p.c.	99—102*	+½	4 13 2
137,500	,,	Dec. 14	4	Edmonton 4 p.c. Deb.	105—107	..	3 14 9
182,380	10	Dec. 29	8	Tuscan, Ltd.	10—10⅛	..	8 0 0
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
30,000	Stk.	Feb. 22	7½	Wands- A 5 p.c.	—	..	—
255,636	,,	,,	6½	worth B 3½ p.c.	133—136	..	4 11 11
75,000	,,	,,	5½	and C 3½ p.c.	110—113	..	4 16 0
69,416	,,	Dec. 29	3	Putney 3 p.c. Deb. Stk.	82—85	..	3 10 7
745,872	,,	Mch. 9	5⅛	West Ham 5 p.c. Ord.	104—106*	+⅛	4 16 6
185,000	,,	,,	,,	Do. 5 p.c. Pref.	121—124*	+⅛	4 0 8
193,300	,,	Dec. 29	4	Do. 4 p.c. Deb. Stk.	102—107	..	3 14 9

Prices marked * are "Ex. div."

† Next dividend will be at this rate.

In moving the adoption of the report (noticed last week) at the annual meeting of John Wright and Eagle Range, Limited, on Thursday, the Chairman (Mr. G. E. Wright) said the feature of the past year's trading had been the very severe competition that they had had to face. They had, however, more than held their own; and the Directors were able to place before the shareholders results which were better than before. The dividend declared amounted to 20 per cent. for the year; and they were adding £10,000 to the reserve, as compared with £5000 for the year 1904. Those were results upon which the shareholders might fairly be congratulated. They were in no small measure due to the outlay which during many years past the Directors had made in perfecting their equipment and organization, in order to meet the severe competition they saw coming. They were now contemplating a considerable addition to their works and plant to cope with the rapidly increasing business of the British Radiator Company—the new branch of their undertaking about which he spoke a year ago. This promised to develop to very large proportions, and to form an important addition to their business. The Directors had increased the investments by upwards of £11,000 during the year, and had raised the total to a figure exceeding the amount of the preference capital, which, therefore, was secured quite apart from the ordinary business assets; and there were no debentures. It was satisfactory to know that, taking the investments as a whole, the market price exceeded the cost price. Those outside the business amounted to a very respectable sum, which was invested in first-class stocks, and formed a magnificent security to the preference shareholders. Mr. S. Sanders seconded the motion, and it was carried unanimously. The dividends recommended were declared.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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Apply, D., 18, Ferndale Avenue, WALTHAMSTOW.

WANTED, a good all-round Gas En- GINEER (between 25 and 35) for a small Works in British Colonies. Good Organizer, familiar with hand and automatic Retort Settings, Water-Gas Plant, and Distribution. Salary £350, and travelling expenses.
Apply, by letter, in first instance, with *copies* of References, to No. 4571, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a large Suburban Gas Company, a DISTRICT INSPECTOR. Must be a thoroughly Practical Fitter, and accustomed to Control of Workmen and the Advising of Consumers, &c. Age between 30 and 40. Commencing Salary, £120 per Annum. None but men who have had good Experience need apply.
Apply, stating Age, Experience, &c., to No. 4574, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FIRM of good standing Wanted to act as SOLE REPRESENTATIVES in this country for the Sale of NEW HIGH-POWER GAS-LAMP (1200-Candle power). Moderate Cost, New Principle, very Economical Working (1½d. per hour), and most suitable for Street Lighting, Workshops, Railway Stations, Show Windows, &c.
For Particulars, write to F. G. ALEXANDER, M.I.M.E., 21, Stoneley Street, Burslem, STAFFORDSHIRE.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

LONDONDERRY GASLIGHT COMPANY.
RESIDENT General Foreman or Works MANAGER wanted by the above Company.
Full Particulars can be obtained upon application to the undersigned.
R. J. Skinner,
Manager and Secretary.

WANTED, a capable Man to detect and remedy Leakage in Colliery district Preference given to one having filled similar position. Would be required to fill in spare time Meter Taking, Service Laying, &c., to instructions of Foreman.
State Age and Wages required, enclosing *copies* of Two recent Testimonials, to No. 4570, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, Gas Meters, Obsolete, Wets or Drys, for Cash.
Rosse Works, Leeds Road, Bradford.

WANTED, Gas Wall Brackets No. 1052; Double Brackets No. 504; Gas Cocks No. 234.
Please address "H. L. 6562," care of Rudolf Mosse, Hamburg.

GAS-MAIN Pipes, Clean and Perfect, Second-Hand 10-inch, 8-inch, 6-inch, 5-inch. Large Stock, drawn from Sockets, no broken ends, from £3 10s. to £4 10s. delivered, according to distance.
Firth Blakeley and Co., Thornhill, Dewsbury.

ONE Bisschop Gas Engine and Pump combined on one bed, 6½-inch cylinder pump, 3½-inch ram, £10. Liquor or Tar Tanks, 24 ft. by 7 ft., 35 ft. by 5 ft., 40 ft. by 5 ft., Rectangular Tank, 10 ft. by 4 ft. by 4 ft.
Apply Whitehouse's Executors, Ilkeston.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. Blakeley, Gas Engineer, Thornhill, Dewsbury.

CANNOCK, HEDNESFORD, AND DISTRICT GAS COMPANY, LIMITED.
OFFERS invited for One C. & W. Walker's PURIFYING-MACHINE, with TAR-EXTRACTOR, 10-inch Valves and Connections complete, to pass 200,000 cubic feet of Gas per Twenty-Four hours. The above Machine may be seen working, and is being replaced by a larger one.
By order of the Directors,
T. A. Nicholls,
Secretary.
Gas-Works, Cannock.

FOR SALE—Two Small Gasholders, one 20 feet diameter by 12 feet deep, with 4 Cast-Iron Columns, Lattice Frame Work, Pulleys, Chains, and Weights complete. The other is 12 feet diameter by 12 feet deep, with 3 Channel Columns, and T-Iron Frame Work, Pulleys, Chains, and Weights complete; also Steel Tank for above holder.
Offers to be sent to J. B. Scott, Manager, Cowdenbeath Gas Company, Limited, from whom further Particulars may be had.
The Purchaser must bear the expense of Taking Down and Removing.

FOR SALE, cheap, the undermentioned—
Four PURIFIERS, 10 ft. by 10 ft. by 4 ft. 6 in. deep, complete.
Two ditto, 10 ft. by 10 ft. by 4 ft. 6 in. deep, complete.
Two ditto, 10 ft. by 5 ft. by 4 ft. deep, complete.
One Cast-Iron SCRUBBER, 12 ft. high by 6 ft. dia.
One ditto 4-inch VERTICAL CONDENSER.
A quantity of good GAS-VALVES, all sizes, from 4-inch to 24-inch diameter.
Inquiries Invited for any other Gas Plant.
Apply to Saml. While & Son, 60, Queen Victoria Street, London, E.C.

TO GAS COMPANIES AND CONTRACTORS.
THE Yeadon and Guiseley Gas Company have for Sale—
Twenty 19 in. by 14 in. by 8 ft. 6 in. overall Q-RETORTS, with Mouthpieces and Lids.
Twenty Sets of 5-inch ASCENSION, ARCH, and DIP PIPES.
Four STEEL HYDRAULIC MAINS, each to accommodate 5 Dip Pipes.
Four Sets of DIRECT FURNACE IRONWORK.
Four SEAL VALVES.
The whole of the Ironwork has never been in use, and was new when erected Seven years ago, when it was decided to adopt Regenerator Settings.
Applications and permission to view to be made to Mr. Edward Lister, Manager.

SPENT OXIDE.
THE Corporation of Stafford invite OFFERS for about 250 Tons of SPENT OXIDE, containing about 60 per cent. of Sulphur.
Samples and further Particulars may be obtained from the undersigned, to whom Tenders should be addressed not later than Monday, the 26th inst.
Hubert Pooley, Assoc.M.Inst.C.E.,
Engineer and Manager.
Gas and Electricity Offices,
Stafford, March 10, 1906.

THE Haworth Urban District Council are prepared to receive TENDERS for the purchase of their surplus TAR and LIQUOR during the year ending March 31, 1907.
Tenders to be sent to me not later than March 22.
William Robertshaw,
Clerk.
Burlington Chambers,
North Street, Keighley.

TEIGNMOUTH URBAN DISTRICT COUNCIL.
(Gas Department.)
THE Gas Committee invite Tenders for their surplus TAR for Twelve Months ending March 31, 1907.
Tenders, endorsed "Tar," to be delivered to the undersigned on or before Saturday, March 24, 1906.
By order,
J. Alex. Gray,
Gas Manager.
Gas-Works, Teignmouth,
March 6, 1906.

TENDERS FOR TAR.
THE Directors of the Horley District Gas Company invite TENDERS for their surplus TAR for Twelve Months, from the 14th of April next, at per Ton of 200 Gallons, delivered into Contractor's Tanks or Barrels at the Company's Works.
Sealed Tenders, endorsed "Tender for Tar," will be received by the undersigned on or before Saturday, the 31st inst.; but the Directors do not bind themselves to accept the highest or any Tender.
By order,
R. Seymour Tobey,
Engineer and Secretary.
March 10, 1906.

COKE.
THE Directors of the Wandsworth and Putney Gas Company invite TENDERS for the removal of about 5000 Tons of Guaranteed "Wandsworth" COKE from these Works between April 1 and Sept. 30 next; the Coke to be removed by Van or Barge (free Waterway on the River Thames).
Sealed Tenders, endorsed "Tender for Coke," to be delivered here not later than the 26th inst.
The Directors reserve to themselves the right to accept any Tender in part or in whole, and do not bind themselves to accept the highest or any Tender.
Any further Information may be obtained from the Engineer, Mr. H. O. Carr.
Charles W. Braine,
Secretary.
Wandsworth and Putney Gas Company,
North Street, Wandsworth, S.W.,
March 12, 1906.

HYDE GAS COMPANY.
TO GASHOLDER MAKERS.
THE Directors of the above Company are prepared to receive TENDERS from experienced makers, for the supply and erection of a STEEL GASHOLDER TANK, 122 feet in diameter and 24 ft. 9 in. deep, with Two-Lift TELESCOPIC GASHOLDER and CONNECTIONS.
The Specification and Drawings may be seen on application to Messrs. Thomas Newbigging and Son, Engineers, 5, Norfolk Street, Manchester; and a copy of the Bill of Quantities may be obtained from the Engineers on deposit of Two Guineas (returnable on receipt of a *bond-fide* Tender).
The Directors do not bind themselves to accept the lowest or any Tender.
Charles Potts,
Secretary and Manager.
Gas Offices, Hyde,
March 7, 1906.

LEEDS CORPORATION GAS-WORKS.
TENDERS FOR DRY GAS-METERS.
THE Gas Committee of the Leeds Cor- poration are prepared to receive TENDERS for the supply of DRY GAS-METERS, to be delivered at their Meter Stores, during a period of Twelve Months from receipt of order.
Each party tendering is required to send, on or before Monday, the 19th inst., Two sample 5-Light Meters (one of which is to be left open for examination), addressed to the Gas-Meter Works, Meadow Lane, Leeds.
Form of Tender may be obtained on application to the undersigned.
Sealed Tenders, to be delivered not later than Monday, the 26th inst., addressed to the Town Clerk, Town Hall, Leeds, and endorsed "Tender for Gas-Meters."
The Committee do not bind themselves to accept the lowest or any Tender.
R. H. Townsley,
General Manager.
Gas Offices, East Parade,
Leeds, March 10, 1906.

BOROUGH OF ASTON MANOR.
(Lighting Department.)
TO LAMP MANUFACTURERS.
THE Public Works Committee invite TENDERS for about 40 Copper STREET LANTERNS, fitted with 2-Light Incandescent Burners with Anti-Vibrators, Chimneys, Crutches, &c., complete with Lantern Holder fitted to a 3-inch neck.
Prices must be accompanied by designs, preferably drawn to a scale half-full size.
Sealed Tenders, endorsed "Lanterns," to be addressed to the Chairman of the Public Works Committee, Council House, Aston Manor, and delivered at the Town Clerk's Office, not later than noon on the 22nd inst.
The lowest or any Tender not necessarily accepted.
The Contract to be entered into will contain the clause adopted by the Corporation having reference to the payment of the standard rate of wages.
By order,
G. H. Jack,
Borough Surveyor.
Council House, Aston Manor,
March, 1906.

LOUGHBOROUGH CORPORATION.
(Gas Department.)
TENDERS FOR TUBES AND FITTINGS.
THE Gas Committee invite Tenders for the supply of TUBES and FITTINGS, from May 1, 1906, to May 1, 1907.
Further Particulars to be obtained from
Edward Onions,
Engineer and Manager.
Gas-Works, Loughborough,
March 6, 1906.

LOUGHBOROUGH CORPORATION.
(Gas Department.)
RENEWAL OF RETORTS.
TENDERS are invited by the Gas Com- mittee for the renewal of RETORTS.
Further Particulars to be obtained from
Edward Onions,
Engineer and Manager.
Gas-Works, Loughborough,
March 6, 1906.

BOROUGH OF STOCKTON-ON-TEES.
TENDERS FOR GAS COAL.
THE Gas Committee are prepared to receive TENDERS for the supply of 30,000 Tons of GAS COAL.
Forms of Tender and Conditions of Contract may be obtained on application to Mr. Wm. Ford, Engineer and Manager, Gas-Works, Stockton-on-Tees.
Tenders, endorsed "Gas Coal," to be delivered to me not later than noon on the 20th inst.
Arthur B. Crosby,
Stockton-on-Tees, Town Clerk,
March 6, 1906.

BRITISH GASLIGHT COMPANY, LIMITED.
NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office on Wednesday, the 28th inst., at Twelve o'clock precisely, to transact the usual Business, and to declare a Dividend for the Half Year ended the 31st of December last.
Notice is Hereby also Given, that the TRANSFER BOOKS of the Company WILL BE CLOSED on the 17th and RE-OPENED on the 29th inst.
By order of the Court of Directors,
H. B. Chamberlain,
Secretary.
Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.,
March 8, 1906.

OTTOMAN GAS COMPANY, LIMITED.
NOTICE is Hereby Given, that the ORDINARY GENERAL MEETING of the Shareholders of this Company will be held at the Offices of the Company, 9, Queen Street Place, Cannon Street, E.C., on Tuesday, the 27th day of March, 1906, at One o'clock in the Afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended the 31st of December last, to declare a Dividend for the same period, to elect a Director and Auditors in place of those retiring, and to transact the General Business of the Company.
The TRANSFER BOOKS WILL BE CLOSED from the 20th day of March until after the Meeting.
By order of the Board,
Thomas Guyatt,
Secretary.
9, Queen Street Place, Cannon Street,
London, E.C., Feb. 27, 1906.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.
MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at Mr. Alfred Richards' Offices, 18, Finsbury Circus, E.C.

By order of the Directors of the
BARKING GAS COMPANY.
NEW ISSUE OF 600 £10 SIX PER CENT. PREFERENCE SHARES.
MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 3, at Two o'clock, in Lots.
Particulars of the Auctioneer, 18, Finsbury Circus, E.C.

At Dalmarnock Chemical Works, 89, Rumford Street, Bridgeton, Glasgow, on Thursday and Friday, the 22nd and 23rd of March, at Twelve noon each day,
IMPORTANT PUBLIC SALE
OF
CHEMICAL Manufacturers' Plant, for TAR DISTILLING, SULPHATE OF AMMONIA MAKING, NAPHTHA REFINING, &c., including STEAM BOILERS, ENGINES, PUMPS, AIR COMPRESSORS, AGITATORS, STILLS, TANKS, CONDENSERS, DYNAMO, and MACHINE TOOLS, &c.
ROBERT M'TEAR & CO., Auctioneers.
Full Particulars in Catalogues, which may be obtained post free from the Auctioneers.
On View Wednesday, the 21st of March, from 10 a.m. till 5 p.m. Special Orders to View prior to Sale can also be had on application.
Royal Exchange Sale-Rooms,
Glasgow, Feb. 28, 1906.

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GAS AND CANNEL COAL MERCHANT,
48, WEST REGENT STREET,
GLASGOW.

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Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
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Class A lifts 24 ft.
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Efficiency Demonstrated.
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CALORIMETER
for determining the calorific value of gases
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UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.
Please apply for Prices, Analyses, and Reports, to the
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ALFRETON IRON-WORKS, DERBYSHIRE,
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Manufacture and keep in Stock at their Works (also large Stock in London)
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Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
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Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
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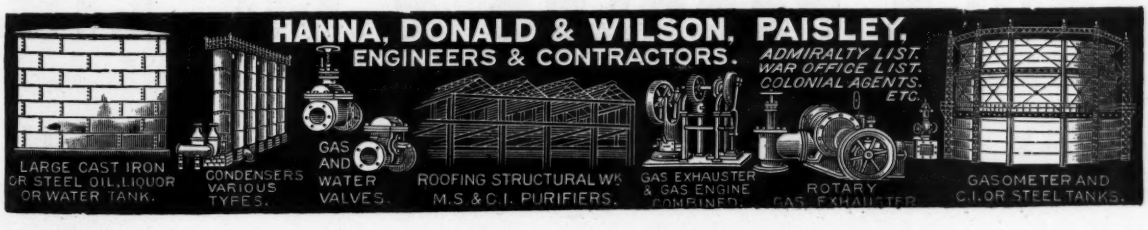
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Station Governors.

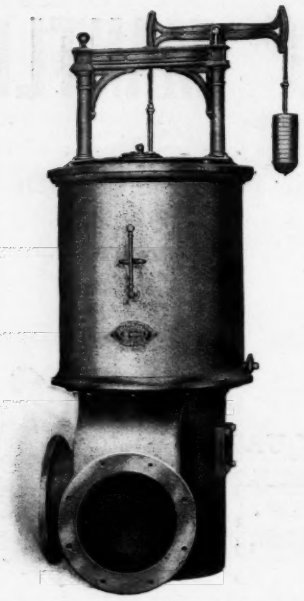

Fig. 1.

Fig. 1. shows our Standard Patent Safety Station Governor. The loading is conveniently arranged to be done by means of small weights on the counter balance lever.

Fig. 2. is our Standard Governor for Air loading from a distance.

In both arrangements the Governors are completely enclosed so that the bell cannot be tilted out of position, and all danger from leakage is avoided.

These Governors are very sensitive in action and give an absolutely constant outlet pressure.

Fig. 2.

District Governors.

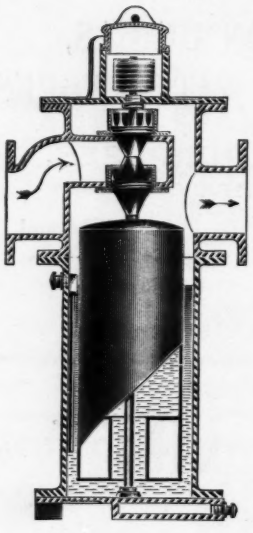

Fig. 3.

Fig. 3. Illustrates our Underground Constant Pressure Governor, while Fig. 4 shows the Differential Underground District Governor. In Fig. 3 the Pressure remains constant irrespective of changes of the Inlet Pressure, while in Fig. 4 the Governor automatically increases or diminishes the pressure following the changes made at the Station Governor. It is particularly useful for Hilly Districts.

Fig. 3 is shown for loading by weights; it may also be regulated by Air Pressure from a distance. Both Governors occupy very little space.

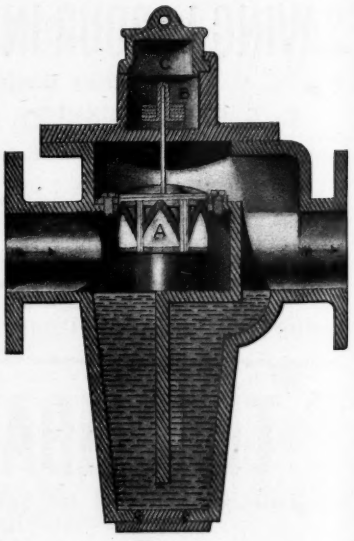

Fig. 4.

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Fig. 35. 100 c.p.

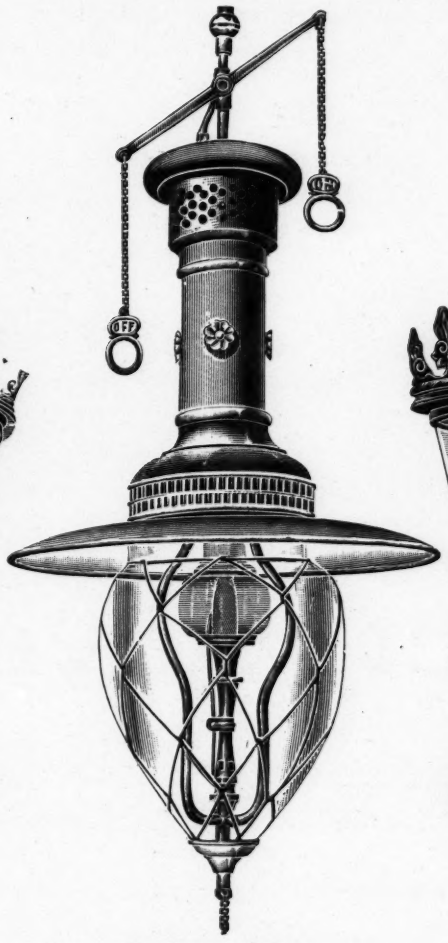

Fig. 607. 600 c.p.
Self-Intensifying.

Fig. 35a. 300 c.p.
Self-Intensifying.

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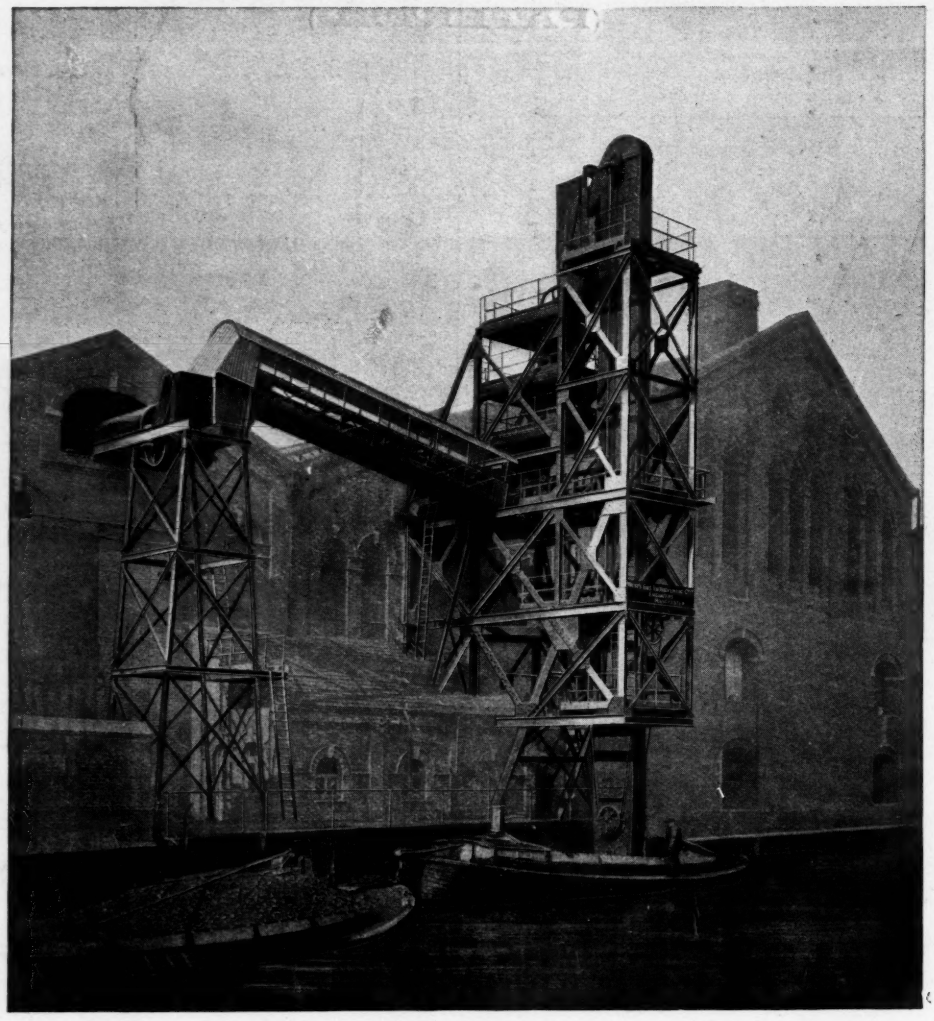

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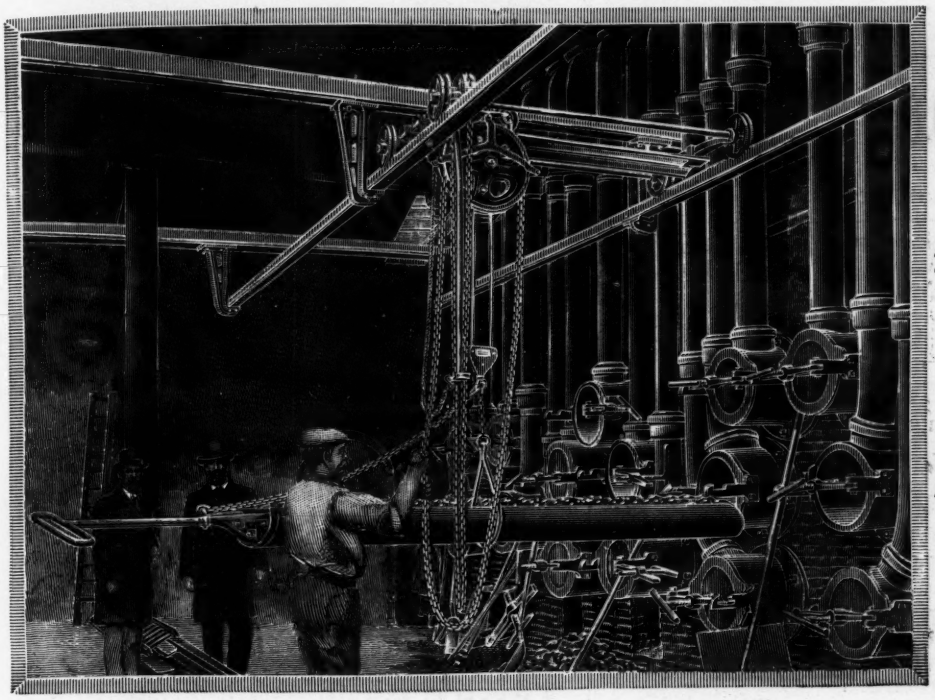

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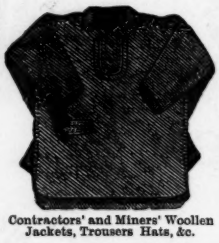
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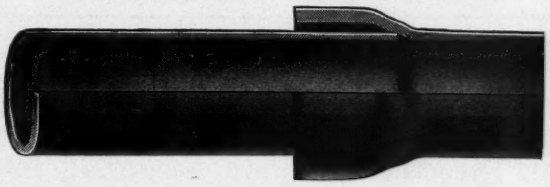

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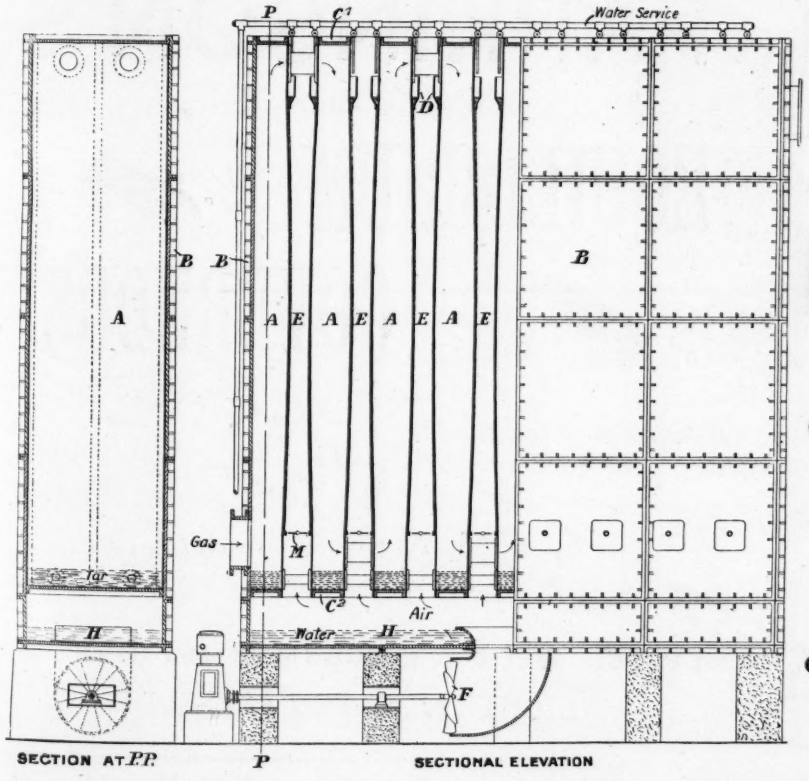

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